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A BIBLIOGRAPHY OF BIRDS

PART 3 SUBJECT INDEX

BY

REUBEN MYRON STRONG

RESEARCH ASSOCIATE, DIVISION OF ANATOMY
FIELD MUSEUM OF NATURAL HISTORY

PROFESSOR AND CHAIRMAN EMERITUS, DEPARTMENT OF ANATOMY
LOYOLA UNIVERSITY MEDICAL SCHOOL, CHICAGO



1

ZOOLOGICAL SERIES
FIELD MUSEUM OF NATURAL HISTORY
VOLUME 25, PART 3

1946

PUBLICATION 581

A BIBLIOGRAPHY OF BIRDS

WITH SPECIAL REFERENCE TO ANATOMY, BEHAVIOR, BIOCHEMISTRY,
EMBRYOLOGY, PATHOLOGY, PHYSIOLOGY, GENETICS, ECOLOGY,
AVICULTURE, ECONOMIC ORNITHOLOGY, POULTRY CULTURE,
EVOLUTION, AND RELATED SUBJECTS

PART 3

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V.253
Cap. 2

PREFACE

The manuscript of this Subject Index was apparently ready in the summer of 1939. Study, however, revealed that most of it could be improved by rearrangement and that much checking for accuracy was needed. Each item was checked against the Author Catalogue by assistants, two or more times. Much additional library work by myself was found desirable, as questions arose. Hardly a week passed during the following two years when it was not necessary to consult publications cited, and usually there were a number of such consultations each day.

Because in the early years of preparation of this work there was uncertainty as to how extensive a subject index was feasible, from the standpoint of expense of publication, and also because there was a gradual evolution in the general plan, there is not a completely consistent recognition of details in publications. For instance, items in **Behavior** and **Ecology** at first were recorded as such without elaboration, but were much subdivided later. Thousands of publications were reviewed one or more times, as the policy of elaboration developed, but it was not feasible to see all publications a second time, especially when they were not in Chicago libraries. However, some were re-examined in the libraries of other cities. This re-examination also involved noting whether publications have literature citations, a practice borrowed from the Dean Bibliography of Fishes after the manuscript for Parts 1 and 2 had been typed.

There is much, but not complete, cross referencing. It is hoped that the Finding Index will supplement the cross references sufficiently to compensate considerably for this incompleteness.

Though both the subject and finding indices are extensive, they do not pretend to include all the topics that occur in publications cited in Parts 1 and 2.

Cordial support by Mr. Stanley Field, President of Field Museum, and by Colonel Clifford C. Gregg, Director of the Museum, has made this project possible. Mr. Karl P. Schmidt, Chief Curator of Zoology, has at all times shown a friendly and helpful interest, as has the Chief Curator Emeritus, Dr. Wilfred H. Osgood.

Acknowledgments are due also to the following ornithologists for aid in substituting scientific names for vernacular names: Messrs. Emmet R. Blake and Rudyerd Boulton, of Field Museum; J. L. Peters, of the Museum of Comparative Zoology, Harvard University;

John T. Zimmer, of the American Museum of Natural History; W. L. McAtee, of the United States Biological Survey; and Dr. Herbert Friedmann, of the United States National Museum. Mr. Boulton kindly arranged the African division in the section on **Fauna**.

Grateful acknowledgment is made to Miss Lillian A. Ross, Editor of Scientific Publications in Field Museum, who had the editorial responsibility for this volume. Her unfailing patience and sense of humor as well as competent management of a difficult undertaking are greatly appreciated.

February, 1941

R. M. STRONG

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RULES AND SYMBOLS EMPLOYED

A. In the Subject Index it was found desirable to divide certain over-large sections into two or more parts. Thus, the division dealing with the brain was separated from the section on the nervous system and made a co-ordinate section. Likewise, the division dealing with the skull was removed from the section on the skeleton.

B. The following order has been used in arranging items for each section:

- (1) Books, grouped according to languages and more or less general for the section.
- (2) General publications found mostly in periodicals.
- (3) Items that have a geographic significance. Not all sections have such a division.
- (4) General publications classified according to species or groups.
- (5) Miscellaneous topics not fitting into any of the various divisions and subdivisions that follow.
- (6) Items classified according to various topics.

When there are not many items in groups 2 and 4, and group 3 is absent, all are combined into one group. Group 2 is sometimes absent. Publications classed as "general" include works (a) that are more or less comprehensive for the section, (b) that were classified before the system of subdivision of sections had been evolved, and that were not afterwards re-examined, or (c) that are limited in scope but are best placed under the main heading, as they do not fit into any of the subdivisions that follow.

C. Many publications have several entries in the indices, but it was not feasible to have a consistent policy of recognition of all topics cited by an author.

D. In each main section of the Index, two and sometimes three conflicting criteria have been involved in the order of arrangement. More general topics precede and more special follow progressively. Alphabetization is also a principle of arrangement, but it has not always been possible to have a strictly alphabetical order of headings in some places and at the same time preserve the general to special progression. Furthermore, there is sometimes more than one reason for such an order. Thus, in the division on the Intestine, occurring in the section on the **Alimentary Canal**, subdivisions occur, with Anatomy, Development, and Histology as headings.

Anatomy, Development, and Histology concern the entire intestine. Subdivisions follow that include gross divisions of the intestine, i.e. Ceca, Diverticulum ilei and Hind gut. These topics are not coordinate with Anatomy, Development, and Histology, nor can they be considered as subdivisions of these topics. The solution of this problem involved placing Anatomy, Development, and Histology of the entire intestine as fourth-rank headings under Intestine, a second-rank heading. Ceca, Diverticulum ilei, and Hind gut are placed one rank higher. The major divisions of the **Alimentary Canal**, i.e. Oral cavity, Esophagus, etc. are arranged according to their rostral to caudal order and not alphabetically. On the other hand, cranial nerves in the section on the **Nervous System** are arranged alphabetically. It has not been possible to give uniform treatment to the sections, each of which must accordingly be scrutinized by the user of the Index.

E. Scientific names of orders and families, when used in taxonomic arrangements, as, for instance, in the section on **Anatomy**, are those employed by Wetmore in his *Systematic Classification of the Birds of the World*. When such names, in non-taxonomic arrangements, differ from those used by Wetmore, the name used by Wetmore is placed in brackets following that used by the author of the publication cited.

Scientific names of species are cited as used by authors, but when a name of more recent usage is available it follows in brackets in many cases; however, this practice was not always feasible. For North American birds, the 1931 *American Ornithologists' Union Check-list* was available. Peters' *Check-list of Birds of the World* was used to some extent for the groups covered by it. Unfortunately, only three volumes of this work had appeared when most of these revisions were made. Hartert's *Die Vogel der paläarktischen Fauna* was also used occasionally for such revisions.

Vernacular names are avoided as far as possible (see also paragraph M of Rules and Symbols, pp. 15-16 of Part 1). Their equivalents in scientific names have been used when possible. The works employed in the revisions of scientific names and mentioned above have been consulted. Various other publications were also used for birds not included in these. Ramsay's *Guide to the Birds of Europe* was especially useful for vernacular names, in various languages, of European birds.

The use of scientific names is variable. Only the genus is mentioned in many cases, either (a) because the author did not mention

the species, (b) because memoranda made when the publication was examined did not include sufficient information, or (c) it was not possible to determine the species when only a vernacular name was used. Group names have been used in paragraphs that also include specific names when (a) the author used only such names, or (b) a vernacular name could not be translated into a specific or generic name, or (c) many species could be thus covered. Names of species, genera, families, etc., usually are listed alphabetically without reference to rank.

F. Textbooks, reference works, and other similar publications are specified as books with the language indicated. Theses and other works giving the results of research, even though not in periodicals, are not usually classed as books. This book classification was attempted with the idea that it might be useful to readers desiring works of this type in certain languages. Books cited for single specific entries are not placed at the beginning (see **B**) of a subdivision but are listed after the special topic.

G. In using the Subject Index, the reader should not assume that the works cited under specific topics and subtopics are the only publications dealing with these topics. Items entered under more general headings preceding in the section should also be consulted. Furthermore, the limitations mentioned on pages 3 and 4 of Part 1 should be considered. The works cited in such sections as **General Works** and **Anatomy** may also include these special topics.

H. The expression "many species" is used where several or more species are mentioned in the work cited. "Includes birds" indicates that other animals than birds are discussed in the publication. "Includes *Columba*" (or any other bird) also means that other animals than birds are treated.

I. Subdivisions with the word "experimental" in their headings do not necessarily include all references cited that involve experimental work.

J. Only the first two initials of an author, his surname, and the year of publication of the article are used in citations. These are usually sufficient for identification in the Author Catalogue. When not sufficient, as in the case of Müller, Reiner, and Müller, Robert, the given name has been spelled out. Portions of a name in parentheses are not ordinarily used.

K. The Century Atlas of the World has been used as the main authority for geographic classifications. Political changes since 1914 have not been recognized.

L. Bold-faced type for the year of publication of an entry indicates that a publication has literature citations. These do not necessarily include birds nor all of the topics treated by the author.

M. Main section headings in cross section references are printed in bold-faced type with an initial capital letter; headings of divisions or subdivisions are printed in roman with an initial capital letter.

N. An asterisk is used in the Subject Index (see N, p. 16 of Part 1) to indicate works regarded as especially important. Its absence does not mean, necessarily, that a publication was considered unimportant. I did not presume to judge importance in some fields with which I am not familiar. Undoubtedly some important works are not thus distinguished, and there may be a difference of opinion as to the significance of some publications which have an asterisk.

O. The spelling "albumen" is used in a morphological sense for the white of an egg; "albumin," with an *i* in the last syllable instead of an *e*, indicates a chemical substance.

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¹ This list contains bibliographies devoted only in part to birds and also the more important bibliographies which are devoted entirely to birds. Special bibliographies on restricted subjects will be found throughout the Subject Index under their respective sections. Citations having the year in bold-faced type contain useful bibliographies of the subjects indicated. Bibliographies of bibliographies are indicated with an asterisk.

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Tameness in park. Beebe, C. W. 1903.

Tameness of unmolested birds. Distant, W. L. 1900.

Visual adaptations. Portier, P. 1923b. *Gallus*. Hess, C. 1907a.

Weapon adaptations. Lucas, F. A. 1895h.

ANATOMIC ADAPTATIONS

General. Bowditch, B. S. 1910. Includes birds. Anthony, R. L. 1912. Picidae. Burt, W. H. 1930. *Struthio*. Duerden, J. E. 1918, 1919d, 1920c, 1923.

Alimentary canal to food. Braun, M. 1879-80.

Diving, adaptation in structure to. *Sula*. Culemann, H. W. 1929.

Form adaptation to feeding habits. Cygninae. Cleland, J. B. 1906.

Heart size at high altitudes. *Lagopus*. Strohl, J. 1910a, b, c, d.

Lack of teeth. Includes birds. Struck, W. 1915.

Beak

General. *Ammodramus*, *Coturniculus*, & *Passerculus*. Trotter, S. 1891. Blood-sucking birds. Moller, W. 1931.

Feeding habits. *Loxia*. Lavauden, L. 1924; Robbins, C. A. 1932. Seed-eating birds. Gloger, C. W. 1856c.

Filter or sieve. *Spatula*. Zander, E. 1908.

Lack of adaptive correlation. *Geospiza*. Snodgrass, R. E. 1902.

Lower mandible

General. Lebedinsky, N. G. 1918b, 1921a. To feeding habits. Many species. Lebedinsky, N. G. 1918a, b, 1921a.

Large rounded bosses on palate and mandible for crushing food. *Coccothraustes*. Pycraft, W. P. 1905c, e.

Foot

General. Beebe, C. W. 1906c. *Hydrallector gallinaceus*. Hencke, H. 1901. *Pygoscelis papua*. Anthony, R. L. 1912.

Integument

General. Fabani, C. 1893b.

Plumage. MacGillivray, W. 1827.

Skeleton

Diving habits. *Biziura*. Pycraft, W. P. 1906b.

Femur. Includes birds. Le Damany, P. 1906.

Flight. Geoffroy St. Hilaire, E. 1838; La Fresnaye, F. 1853.

Sternum. *Sula*. Flower, J. 1879b.

Vertebral column. Includes *Ardea*. Virchow, H. J. 1914.

Stomach

Seasonal adaptations. *Larus*. Semper, K. G. 1881.

Gizzard. Anon. 1719. Many species. Pilliet, A. H. 1894. *Anser* & *Falco*. *Roux, W. 1906.

Tongue

General. Gardner, L. L. 1925; Lucas, F. A. 1895e. Bloodsucking birds. Moller, W. 1931.

Condition. *Gallus*. Mercier, L. & Poisson, R. 1927.

Food. Picidae. Lucas, F. A. 1895e.

COLOR ADAPTATIONS

General. Gadow, H. F. 1910; Macpherson, H. B. 1909b; Wallace, A. R. 1868a, b. Includes birds. Swynnerton, C. F. 1919. Passeres. Braun, F. 1900d.

Coloration to geographic distribution. Meyer, R. 1874.

Egg color. Many species. Lucas, A. H. 1887.

Insects supposedly protectively colored, as well as bad tasting or having warning colors, eaten freely by birds. Judd, S. D. 1899b.

Whiteness of breast in crevice-searching birds. *Catherpes*. Grinnell, J. 1924b.

EGG ADAPTATIONS

Egg envelopes for protection against heat, cold, and desiccation. Loisel, G. 1900e.

Excessive humidity. Loisel, G. 1900h.

Shape of eggs. Mathematical analysis. Mallock, A. 1925.

Shell structure to respiration. Ogilvie, G. 1867.

ENVIRONMENTAL ADAPTATIONS

General. Sub-Antarctic birds. Bennett, A. G. 1927.

Burned-over areas. Pennsylvania. Weygandt, C. 1911.

Effects of civilization. Many species. Otto, H. 1907.

French Alps. Includes birds. Perolle, L. 1899.

Adaptation to new environment

Introduced species. *Acridotheres tristis*. Stoner, D. 1923b. *Chenopsis*. Gunther, R. T. 1917a.

Death Valley. *Passer domesticus*. Grinnell, J. 1919.

Urban conditions. *Speotyto cunicularia hypugaea*. Abbott, C. G. 1930.

Climatic adaptations

Acclimatization and declimatization. Many species. Wolda, G. 1923.

African climate. Lönnerberg, A. J. 1926a.

Body size. Boetticher, H. 1913.

High altitudes

General. Includes birds. Hingston, R. W. 1926.

FLIGHT ADAPTATIONS

General. Allen, J. A. 1887-88; Amans, P. C. 1885; Anthony, R. L. 1910; Böker, H. 1921, 1927a; Brooks, W. K. 1874; Finter, K. 1926; Legal, E. & Reichel, P. 1879-85, 1881; Lull, R. S. 1906. Includes birds. Pettigrew, J. B. 1870. *Opisthocomus* & *Stringops*. Böker, H. 1929.

Body form. Adaptation to flight. Gröbbels, F. 1926a, c; Lesmüller, A. 1906; Pütter, A. 1917.

Structural adaptations

General. Nordmann, C. 1923b, 1924.

Organs of flight

General. Amans, P. C. 1885.

Tail. Baskett, J. N. 1910; Lorenz, K. 1933. *Ammodramus*, *Coturniculus*, & *Passerculus*. Trotter, S. 1891.

Wing

General. Blasius, J. H. 1866; Lancaster, J. 1886d; *Lorenz, K. 1933.

Emargination of primaries. Coues, E. B. 1888a.

Gliding flight. Walker, G. T. 1925.

FUNCTIONAL ADAPTATIONS

Cells in tissue culture. *Gallus*. Weiss, P. 1928.

Digestive organs. *Anas*. Weiss, G. 1901.

HABITS

General. *Didunculus strigirostris*. Whitmee, S. J. 1875b.

Arboreal habits. Anthony, R. L. 1912.

Birds in captivity. Finn, F. 1892b.

Changes in habit. Beak weaker and curved. *Colaptes auratus*. Sharp, B. 1889.

Breeding

General. Swynnerton, C. F. 1917a.

Nesting habits. Burns, F. L. 1924; Peck, M. E. 1908; Wallace, A. R. 1867b; Anon. 1869a.

Parasitic breeding habits. *Cuculus*. Baker, E. C. 1923.

To parasitic cuckoos' eggs. Baker, E. C. 1913a.

Feeding

General. *Anser*. *Schepelmann, E. 1906. Nearctic birds. *McAtee, W. L. 1932d.

Feeding on flowers. Porsch, O. 1924a, b, 1926.

MIMICRY

General. Finn, F. 1896; Heikertinger, F. 1921. Includes birds. Beddard, F. E. 1892c.

Egg mimicry. *Cuculus*. Cipriani, L. 1926.

ALIMENTARY CANAL

See also under Digestion, Nutrition, and Physiology.

Books. Text in Dutch. Postma, G. 1887. Includes birds. Brants, M. A. 1881.

Text in English. Grew, N. 1681; Owen, R. 1866-68. *Lagopus scoticus*. Wilson, E. A. 1911c.

Text in German. Gadow, H. F. 1891d; Möllendorff, W. 5, 1927-30; Tiedemann, F. & Gmelin, L. 1831;

Wolff, C. F. 1812. Includes birds.
Oppel, A. 1896-97.

Text in Swedish. Kjellmann, A. F. 1875.

General. Geoffroy St. Hilaire, E. 1822d, e. Many species. Forbes, W. A. 1880e; Gadow, H. F. 1876a; Oppel, A. 1898.

Aedirhinus. Haswell, W. A. 1883a.
Aeronautes. Marshall, M. E. 1907.
Alcedo hispida. Cunningham, R. O. 1870.
Apitenodytes patachonica. Reid, J. 1835.
Bubo. Marshall, M. E. 1907.
Buceros cavatus. Owen, R. 1833.
Calodromas. Beddard, F. E. 1890b.
Casuaris galeatus. Knox, R. 1824c; *Meckel, J. F. 1830.
Cephalopterus. Eyton, T. C. 1861.
Ceryle stellata. Cunningham, R. O. 1870.
Chauna. Crisp, E. 1864b.
Ciconia. Anon. 1733c.
Coccothraustes. Heister, L. 1727.
Cochleariidae. Murie, J. 1872b.
Columba. Brugnone, C. G. 1805-08.
Corythaix porphyreolepha. Owen, R. 1834b.
Cuculus. Smith, J. A. 1858b.
Dacelo gigas. Cunningham, R. O. 1870.
Dicholophus cristatus. Gadow, H. F. 1876b.
Dromaeus [Dromiceius]. Knox, R. 1824c, 1832.
Eurymorhynchus. Anderson, J. 1879b.
Eurypygidae. Murie, J. 1872b.
Gallus. Brugnone, C. G. 1805-08; Fleischmann, A. 1924; Hartmann, P. J. 1689d.
Geococcyx. Marshall, M. E. 1907.
Megapodidae. Oustalet, J. F. 1880.
Notornis. Benham, W. B. 1899a, b.
Opisthocomus. Deville, E. 1852.
Phalacrocorax. Perrault, C. 1733h.
Phalaenoptilus. Marshall, M. E. 1906.
Phoenicopterus. Gadow, H. F. 1877a.
Plotus. Garrod, A. H. 1878b.
Podoa. Giebel, C. G. 1861b.
Procelariiformes. Gadow, H. F. 1891a, d.
Psophia crepitans. Traill, T. S. 1826.
Rhea. Gadow, H. F. 1885.
Rhinocetidae. Murie, J. 1872b.
Steatornis. Garrod, A. H. 1873c.
Struthio. Duverney, J. G. & Méry, J. 1733.
Perrault, C. 1733a.
Sturnella. French, G. H. 1898.
Thalassidroma. MacGillivray, W. 1838-39.
Trochilus colubris. Crisp, E. 1862b.
Turacoena. Haswell, W. A. 1883a.
Uria. MacGillivray, W. 1838-39.

Fine figures. *Aquila & Buteo*. MacGillivray, W. 1837.

Anatomy

General. *Gadow, H. F. 1879; MacGillivray, W. 1837. Many species.

Kahlbaum, C. L. 1854. Includes birds.
Neergaard, J. W. 1806.

Alcedo. Postma, G. 1887.
Anser. Kaiser, H. 1925.
Columba. Kaiser, H. 1925; Postma, G. 1887.
Cypselus. Postma, G. 1887.
Dicaeidae. Desselberger, H. 1931.
Eudypetes. Bartram, E. 1901.
Larus & Nucifraga. Postma, G. 1887.
Regulus. Greschik, J. 1918b.
Turdus. Postma, G. 1887.

Adaptation to nature of food. Braun, M. 1879-80.

Blood supply. Gadow, H. F. 1879.

Development. *Gallus*. Boyden, E. A. 1919; Kashchenko, N. F. 1887.

Innervation. Shin, F. 1930. *Gallus*. *Nolf, P. 1925c.

Measurements. Struthious birds. Crisp, E. 1864a.

Mesenteries. *Columba & Corvus*. Robert, H. L. 1837.

Taxonomic characteristics. *Attagis & Thinoecurus*. Garrod, A. H. 1877c.

Topographic relations. *Gallus*. Fleischmann, A. 1924.

Histology

Books. Text in English. *Lagopus scoticus*. Wilson, E. A. 1911c.

Text in German. Goette, A. W. 1867.

General. Braitmaier, H. 1904. Many species. Kahlbaum, C. L. 1854. Includes birds. Leydig, F. 1854a.
Alcedo. Postma, G. 1887.
Anser. Kaiser, H. 1925.
Columba. Kaiser, H. 1925; Postma, G. 1887.
Cypselus. Postma, G. 1887.
Eudypetes. Bartram, E. 1901.
Larus & Nucifraga. Postma, G. 1887.
Regulus. Greschik, J. 1918b.
Turdus. Postma, G. 1887.

Glands. Jobert, C. 1873b. Many species. Kahlbaum, C. L. 1854.

Physiology

General. Braitmaier, H. 1904; *Gadow, H. F. 1879; MacGillivray, W. 1837. Includes birds. Neergaard, J. W. 1806.
Dicaeidae. Desselberger, H. 1931.

Effects of experimental diet. Magnan, A. 1914b.

Peristalsis. Nolf, P. 1925a, b, c, 1927.

ORAL CAVITY

This section includes articles dealing with the mouth.

General. *Anas*. Belogolowy, J. A. 1910a. Cathartidae. Beddard, F. E. 1903a. *Gallus*. Belogolowy, J. A. 1910a. *Otis*. Murie, J. 1869. *Passer*. Pinaroli, A. 1926. *Tinnunculus* & *Turdus*. Belogolowy, J. A. 1910a.

Development. Many species. Salvi, G. 1903b, 1905.

Buccal pouch. *Nucifraga caryocatactes*. Sinéty, S. 1852.

Anatomy

General. Many species. *Heidrich, P. K. 1908.

Dental ridges. Reeker, H. 1892.

Development of spines of mouth and tongue. Jeffries, J. A. 1883b.

Histology of oral cavity. Many species. Heidrich, P. K. 1908.

Roof of mouth. Embryonal differentiation. *Fringilla canaria*. Stellwaag, F. 1912.

GULAR POUCH

A pouch of variable size and shape connected with the floor of the mouth near the base of the tongue. It has been the subject of great controversy. In the Pelecaniformes and especially in the pelicans, it is a food storage chamber. In male Otidae, however, it is a long narrow sac connected with the mouth cavity by a relatively small opening, and it may be inflated and used in a display performance, during the breeding season.

Books. Text in English. *Otis*. Albin, E. 1740.

Text in French. *Otis*. Degland, C. D. 1849; Pallas, P. S. 1793.

Cypselus apus. Heming, G. O. 1834. *Eupodotis*. Elliot, W. 1880; Forbes, S. A. 1880b; Garrod, A. H. 1874a, c. *Leptoptilus crumeniferus*. Peters, W. K. 1866. *Otis*. Bloch, M. E. 1782; *Cullen, W. H. 1865; Flower, W. H. 1865; Garrod, A. H. 1874a, c; Giebel, C. G. 1861a; *Murie, J. 1868a, 1869; *Newton, A. 1862; Owen, R. 1835-1836; *Pycraft, W. P. 1898c; Ramsay, E. P. 1867; Tegetmeier, W. B. 1866; Yarrell, W. 1855.

Histology and physiology. *Pelecanus*. Kühnau, W. 1932.

TEETH IN BIRDS

Book. Text in German. *Hesperornis*. Terra, P. 1911.

General. Geoffroy St. Hilaire, E. 1821; Giebel, C. G. 1880b.

Four rows of conical projections in nestling, suggesting palatal teeth of Reptilia. *Panurus b. biarmicus*. Pycraft, W. P. 1908a.

In embryo

Books. Text in English. Includes birds. Morgan, T. H. 1903.

Text in German. Terra, P. 1911.

General. Blanchard, C. E. 1860b; Fraisse, P. 1881a, c; Geoffroy St. Hilaire, E. 1821. Includes birds. Anson, B. J. 1929. *Gallinula*, *Haematopus*, & *Limosa*. Willink, H. D. 1899a, b. *Melopsittacus*. Ihde, —. 1912; Keibel, F. 1901b. *Numenius* & *Oedicnemus*. Willink, H. D. 1899a, b. *Psittacus*. Fraisse, P. 1880, 1881a, c. *Sterna*. Röse, C. 1892; Willink, H. D. 1899a, b. *Struthio*. Röse, C. 1892.

TONGUE

Books. Text in English. Kidd, A. 1907; Owen, R. 1866-68.

Text in German. Beautiful plates. Includes birds. *Ludwig, F. 1884b.

General. Chaine, J. 1905a; Gardner, L. L. 1927a; Giebel, C. G. 1858. Good figure. Borrichius, O. 1673a.

Many species. Lucas, F. A. 1895e, 1897c; Nitzsch, C. L. & Giebel, C. G. 1858; Schenkling-Prévôt, C. 1894, 1895e. Birds incidental. Mayer, A. F. 1844; Minot, C. S. 1880b; Oppel, A. 1902b. Bloodsucking birds. Moller, W. 1931.

Acanthorhynchus. Lucas, F. A. 1894c. *Accentor*. Sigismund, B. 1863. *Accipiter*. Beddard, F. E. 1903c. *Alcedo hispida*. Cunningham, R. O. 1870. *Anas*. Borrichius, O. 1673a. *Anser*. Borrichius, O. 1673a; Sigismund, B. 1863. *Aptenodytes*. Forster, J. R. 1781; Le Souëf, W. H. 1902b. *Aquila*. Borrichius, O. 1673a. *Ardea*. Muralto, J. 1683b. *Caprimulgidae*. Slater, P. L. 1866a. *Cathartidae*. Beddard, F. E. 1903a. *Cephalopterus penduliger*. Eyton, T. C. 1861. *Certhidia*. Snodgrass, R. E. 1903. *Ceryle stellata*. Cunningham, R. O. 1870. *Cochleariidae*. Murie, J. 1872b. *Cocornis*. Snodgrass, R. E. 1903. *Coereba*. Lucas, F. A. 1895c. *Coraciidae*. Wetmore, A. 1919d. *Dacelo gigas*. Cunningham, R. O. 1870. *Dendroica tigrina*. Lucas, F. A. 1894c. *Eurypygidae*. Murie, J. 1872b. *Fringilla*.

Sigismund, B. 1863. Includes *Gallus*. Reuter, F. L. 1820. *Gecinus*. Wolf, J. 1800a. *Geospiza*. Snodgrass, R. E. 1903. *Glossoptila*. Lucas, F. A. 1895c. *Irrisor*. Strickland, H. E. 1843. *Lepidosoma discolor*. Selater, P. L. 1895c. Micropodidae. Ridgway, R. 1892b; Shufeldt, R. W. 1895c. *Nestor*. Dorner, H. 1873; Garrod, A. H. 1872b. *Otis*. Murie, J. 1869. *Parus*. Sigismund, B. 1863. *Phaethon*. Brandt, J. F. 1840b. Picidae. Lucas, F. A. 1895f, 1896g; Waller, R. 1716. *Picus*. Chaine, J. 1904d; Jacobaeus, O. 1680. *Picus v. viridis*. Wolf, J. 1800a. *Plegadis*. Greschik, J. 1922. Psittaci. Borrichius, O. 1673a; Weinland, D. F. 1855. *Regulus*. Greschik, J. 1918b; Sigismund, B. 1863. Rhinocetidae. Murie, J. 1872b. *Rhinocetes jubatus*. Marshall, W. A. 1870. *Scolopax*. Sigismund, B. 1863. Tenuirostres. Gadow, H. F. 1883. *Tetrao u. urogallus*. Hellmann, A. 1853a. Trochilidae. Gosse, P. H. 1863; Ridgway, R. 1892b; Shufeldt, R. W. 1893a. *Upupa*. Strickland, H. E. 1843. *Zosterops*. Beddard, F. E. 1891b.

Color variations in young birds. Ingram, C. 1907b.

Markings on tongue in young birds. Ingram, C. 1907b.

Relation of form to character of food. Pici. Lucas, F. A. 1895g.

Tongue muscle function. Duvernoy, G. L. 1836.

Anatomy

General. Include birds. Duvernoy, G. L. 1811b, 1835a; Minot, C. S. 1880b.

Campethera & *Dendropicos*. Steinbacher, J. 1935. Drepanidae. Scharnke, H. 1932. Falconidae. Greschik, J. 1928. *Jynx*. Jourdan, E. 1890. Meliphagidae. Scharnke, H. 1931. Nectariniidae. Scharnke, H. 1932. *Phoenicoplerus*. Manis, S. 1906. Pici. Jacobaeus, O. 1680. Picidae. *Leiber, A. 1907a, b; Lucas, F. A. 1895g; Scharnke, H. 1931. *Picus viridis*. Huber, V. A. 1821. Promeropidae. Scharnke, H. 1932. Psittaci. Ciaccio, G. V. 1878, 1900. *Thripas*. Steinbacher, J. 1935. Trochilidae. Lucas, F. A. 1892b; Scharnke, H. 1930c, 1931. *Vultur*. Rapp, W. L. 1847b.

Extension of horns of hyoid apparatus over skull and into right nasal cavity. *Picus*. Lindahl, J. 1879.

Joint in tongue. *Gallus*. Hollis, W. A. 1900-01.

Muscles of tongue. Many species. *Chaine, J. 1905a.

Relation to palate and nasopharynx. Good figures. Göppert, E. 1903.

Development

Anas. *Kallius, E. 1905. *Gallus*. Cuccati, G. 1889; Mall, F. P. 1887. Meliphagidae. Scharnke, H. 1931. *Melopsittacus*. *Kallius, E. 1906. *Passer*. *Kallius, E. 1905. Picidae. Scharnke, H. 1931. *Serinus*. Stellwaag, F. 1912. Trochilidae. Scharnke, H. 1931.

Physiology

General. Picidae. *Leiber, A. 1907a.

Functions. Lucas, F. A. 1895g.

Movements of tongue. Méry, J. 1733e. Includes birds. Duvernoy, G. L. 1811b. *Picus viridis*. Huber, V. A. 1821.

PHARYNX

A poorly defined region in adult bird, which is not recognized by some authors.

General. Many species. *Heidrich, P. K. 1908. *Anas*. Belogolowy, J. A. 1910a. Cathartidae. Beddard, F. E. 1903a. Includes *Fringilla*. Kriegbaum, A. 1911. *Gallus*. Belogolowy, J. A. 1910a. *Passer*. Pinaroli, A. 1926. *Turdus*. Belogolowy, J. A. 1910a.

Development

General. Many species. *Salvi, G. 1905. Includes birds. Chauveau, C. 1900.

Gallus. Cadiat, L. O. 1878b. Includes *Gallus*. Liessner, E. 1887, 1889; *Mall, F. P. 1887; *Salvi, G. 1903b. *Passer*. *Salvi, G. 1903b. *Serinus*. Stellwaag, F. 1912.

Mode of perforation of pharyngeal membrane. *Gallus*. *Manno, A. 1903.

Histology

General. Many species. *Heidrich, P. K. 1908. *Corvus*. Greschik, J. 1914b.

Mucosa. Histology and physiology. *Gallus*. Heidrich, P. K. 1905.

Pharyngeal pouch. *Cypselus apus*. Heming, G. C. 1834. Histology and physiology. *Pelecanus*. Kühnau, W. 1932.

CROP

Book. Text in German. *Anser*, Falcones, *Gallus*, & *Meleagris*. Tiedemann, F. & Gmelin, L. 1831.

General. Many species. Swenander, G. 1899; Wolf, J. 1799. Predatory birds. Wolf, J. 1805b.

Columba. Arcangeli, A. 1904, 1909; Teichmann, M. 1889. *Gallus*. Lentilius, R. 1690; Mangold, E. 1906. *Opisthocomus*. Böker, H. 1929; Gadow, H. F. 1891-93; Perrin, J. B. 1877. *Stringops*. Böker, H. 1929.

Anatomy

General. Many species. Swenander, G. 1902.

Anatomy during breeding period. *Columba*. Niethammer, G. 1933; Yoschida, S. 1915.

Development

General. *Böker, H. 1927b. *Columba*. Wölfler, A. 1880.

Changes in last hours of incubation and at beginning of feeding young. *Columba*. Ficatier, A. & Desfosses, L. 1879.

Histology

Many species. *Bartels, P. 1895; Swenander, G. 1902. *Anser*. Berlin, W. 1852-53. *Columba*. Arcangeli, A. 1909; Hasse, C. 1865; Phisalix, C. A. 1890.

Blood vessels. Kuriyama, T. 1931. *Columba*. Phisalix, C. A. 1890.

Glands. *Columba*. *Dulzetto, F. 1928a, b.

Lymphatics. Location and direction of flow. *Gallus*. Kutsuna, M. & Kuriyama, T. 1932.

HISTOLOGY WHEN FUNCTIONING

General. *Columba*. Arcangeli, A. 1904.

During brooding of eggs and period of feeding young. *Columba*. *Litwer, G. 1926; Niethammer, G. 1933; Yoschida, S. 1915.

Innervation and activity. *Columba* & *Gallus*. Ihnen, K. 1928.

Physiology

General. Iljin, M. D. 1913b. *Anser*. Berlin, W. 1852-53. *Columba*. Hasse, C. 1865; Niethammer, G. 1933.

Digestive function. *Columba*. Dulzetto, F. 1927.

Emptying with different foods. *Columba* & *Gallus*. Ihnen, K. 1928.

Feeding experiments after extirpation of crop. *Gallus*. Kawakami, Z. 1913.

Prolactin effects. *Streptopelia*. Riddle, O., Bates, R. W., & Dykshorn, S. W. 1932.

Movements. *Columba* & *Gallus*. Ihnen, K. 1928.

Reactions of circular muscle in anaphylactic shock. *Columba*. Hanzlik, P. J. & Stockton, A. B. 1927.

Regeneration. *Columba* & *Gallus*. Kuriyama, T. 1932.

Secretion

Columba. Charbonnel-Sallé, —. & Phisalix, C. A. 1886b; Hunter, J. 1786; Phisalix, C. A. 1890.

Chemical composition. Reid, E. W. 1894.

Effect of anterior pituitary gland hormone on secretions. Columbidae. Riddle, O. & Braucher, P. F. 1931.

Effect of castration. Columbidae. Riddle, O. & Dykshorn, S. W. 1932.

Relation to milk. *Columba*. Hasse, C. 1865.

ESOPHAGUS

Books. Text in German. Heidrich, P. K. 1905.

Text in Latin. Redi, F. 1729.

General. Holmgren, F. 1867. Many species. Swenander, G. 1904b.

Cephalopterus penduliger. Eyton, T. C. 1861. *Chrysopteris*, *Diomedea*, & *Manucodia*. Pavesi, P. 1876-77. *Opisthocomus cristatus*. Perrin, J. B. 1877. *Platalea* & *Tantalus*. Garrod, A. H. 1875d. *Toccos*. Gulliver, G. 1872.

Inflation of proximal portion. Anon. 1901b. *Eupodotis denhami*. Forbes, W. A. 1880b.

Special function of esophagus. Booming of bittern. Chapin, J. P. 1922.

Vascular supply. Kuriyama, T. 1931.

Anatomy

Many species. Swenander, G. 1902, 1904b.

Columba. Hasse, C. 1865. *Gallus* & *Haliaeetus albicilla*. Grimm, J. D. 1866.

Development

Alcidae, Anatidae, & *Colymbo*. Schreiner, K. E. 1900. *Gallus*. Cadiat, L. O. 1878b. Include *Gallus*. Meuron, P. 1886b; Pensa, A. 1910. Laridae. Schreiner, K. E. 1900.

Histology

Many species. *Bartels, P. 1895; Swenander, G. 1902.

Alcidae & Anatidae. *Schreiner, K. E. 1900. *Columba*. Hasse, C. 1865. *Colymbo*. *Schreiner, K. E. 1900. *Corvus*. Greschik, J. 1914b. *Gallus*. Grimm, J. D. 1866; Schumacher, S. 1926. *Haliaeetus albicilla*. Grimm, J. D. 1866. Laridae. *Schreiner, K. E. 1900.

Lymph nodules. *Columba*. *Arcangeli, A. 1914.

Motor innervation. Kreidl, A. 1895.

Musculature. Includes birds. Eura, S. 1927. *Pelecanus* [*Phalacrocorax*] *carbo*. Yarrell, W. 1828a.

Striped muscle in Raptores, deficiency of. Gulliver, G. 1870.

Esophageal glands

General. *Columba*. *Arcangeli, A. 1914.

Development. *Gallus*. Schumacher, S. 1925b, 1926.

Phylogeny. *Androglossa*. Greschik, J. 1917a.

STOMACH

Books. Text in English. Grew, N. 1681. *Otis*. Albin, E. 1740.

Text in German. Möllendorff, W. 5, 1927-30. *Anser*, Falcones, *Gallus*, & *Meleagris*. Tiedemann, F. & Gmelin, L. 1831.

Text in Latin. Auerbach, L. 1863.

General. Anderson, R. J. 1912; Cattaneo, G. 1888; Gadow, H. F. 1891a, d; Hérisant, F. D. 1757b; Leuckart, F. S. 1841; Sommer, J. G. 1697-98. Many species. Swenander, G. 1904b; Wolf, J. 1799. Includes birds. Nuhn, A. 1870.

Anas. Hartmann, P. J. 1689h. *Anastomus oscitans*. Mitchell, P. C. 1915b. *Anser*. Hartmann, P. J. 1689h; Peyer, J. C. 1683. *Ardea*. Guimard, V. 1925. *Buceros*. Bartlett, A. D. 1869. *Carpophaga*. Viallane, H. 1878a. *Carpophaginae*. Cadow, G.

1933. *Cephalopterus penduliger*. Eyton, T. C. 1861. *Cereopsis novae-hollandiae*. Yarrell, W. 1831a. *Chauna*. Garrod, A. H. 1876e. *Ciconia*. Peyer, J. C. 1684. *Corythaix*. Martin, W. C. 1836a. *Cuculus*. Hérisant, F. D. 1756. *Falco*. French, G. H. 1898. *Fringilla*. Holmgren, F. 1867. Gallinae. Sommer, J. G. 1697-98. *Gallus*. Baistrotchi, E. 1886; Peyer, J. C. 1677. *Microglossus*. Geoffroy St. Hilaire, E. 1823c. *Micropterus*. Cunningham, R. O. 1871-72. *Penelope*. Yarrell, W. 1833c. *Plotus*. Cazin, M. 1884; *Garrod, A. H. 1876c. *Podiceps*. Madon, P. 1926b. *Rhea*. Holmgren, F. 1867. *Rhinochaetes jubatus*. Marshall, W. A. 1870. *Struthio*. Duverney, J. G. & Méry, J. 1733; Gadow, H. F. 1891a; Taschenberg, E. O. 1879b; Anon. 1733d. *Sturnella*. French, G. H. 1898. *Tantalus*. Swinhoe, R. 1867. *Vultur* [*Sarcophagus*] *gryphus*. Harlan, R. 1830.

Anatomy

General. Nagy, J. 1860. Many species. Cazin, M. 1886c; Home, E. 1812; Swenander, G. 1902, 1904b.

Aethopyga. Forbes, W. A. 1880a. *Alcedo*. Bergonzini, C. 1885. *Anas*. Doyon, M. 1894a; Hartmann, P. J. 1689h. *Anser*. Grimm, J. D. 1866; Hartmann, P. J. 1689h; Home, E. 1810. *Calliste*. Forbes, W. A. 1880a. *Carduelis*. Bergonzini, C. 1885. *Chlorophonia* & *Coereba*. Forbes, W. A. 1880a. *Columba*. Bergonzini, C. 1885; Doyon, M. 1894a; Oppel, A. 1897; Retzius, A. A. 1842b. *Coracias*. Retzius, A. A. 1842b. *Cygnus*. Home, E. 1810. *Euphonia*. Forbes, W. A. 1880a; Steinbacher, G. 1935c. *Fuligula*. Retzius, A. A. 1842b. *Gallus*. Doyon, M. 1894a; Grimm, J. D. 1866; Oppel, A. 1897. *Haliaeetus albicilla*. Grimm, J. D. 1866. *Larus*. Retzius, A. A. 1842b. *Meleagris*. Home, E. 1810. *Melospittacus*. Bergonzini, C. 1885. *Passer*. Doyon, M. 1894a. *Phasianus*. Retzius, A. A. 1842b. *Pitylus*, *Tachyphonus*, & *Tanagra*. Forbes, W. A. 1880a.

Development

General. Many species. Cattaneo, G. 1884. Alcidae, Anatidae, & *Colymbo*. *Schreiner, K. E. 1900. *Gallus*. Cazin, M. 1887c. Includes *Gallus*. Laskovsky, N. 1868. Laridae. *Schreiner, K. E. 1900. *Tanagra*. Wetmore, A. 1914.

Taxonomic consideration. Many species. Swenander, G. 1903.

Histology

General. Many species. *Cattaneo, G. 1884; *Cazin, M. 1887b; Molin, R. 1852; Swenander, G. 1902.

Aedon. Molin, R. 1852. Alcidae. *Schreiner, K. E. 1900. *Anas*. *Cazin, M. 1887b. Anatidae. *Schreiner, K. E. 1900. *Anser*. Grimm, J. D. 1866; Molin, R. 1852. *Asio*. *Greschik, J. 1914a. *Buteo*. *Greschik, J. 1914a; *Hasse, C. 1866. *Columba*. Braitmaier, H. 1904; Molin, R. 1852. *Colymba*. *Schreiner, K. E. 1900. *Corvus*. Greschik, J. 1914a, b. *Cygnus*. *Hasse, C. 1866. *Falco*. Molin, R. 1852. *Fringilla* & *Striz*. *Hasse, C. 1866. *Gallinula*. Molin, R. 1852. *Gallus*. *Cazin, M. 1887b; Grimm, J. D. 1866; Greschik, J. 1914a; *Hasse, C. 1866; Molin, R. 1852. *Haliaeetus albicilla*. Grimm, J. D. 1866. *Hydrocorax*. Curl, H. C. 1911. *Jynx* & *Lanius*. Greschik, J. 1914a. Laridae. *Schreiner, K. E. 1900. *Pelecanus*. Molin, R. 1852. *Psittacus*. *Hasse, C. 1866.

GLANDS

Book. Text in German. Many species. Müller, J. P. 1830b.

General. Many species. Home, E. 1812. Birds incidental. Glaettli, R. 1852; Oppel, A. 1896. *Anser*. Gröbbels, F. 1924a; Anon. 1769. *Columba*. Gröbbels, F. 1924a. *Gallus*. Cazin, M. 1885.

Hydrochloric acid formation. Includes *Gallus*. Harvey, B. C. & Bensley, R. 1912.

Cytology. Includes birds. Hirano, K. 1927.

Histology

General. Wilczewski, P. 1870. Fine illustrations. Many species. *Bergmann, C. G. 1862b.

Gland ducts and canaliculi. Includes many species. Monti, R. 1898b.

Innervation. *Anas*, *Columba*, & *Gallus*. Doyon, M. 1894b.

Pylorus glands. *Anas*, *Columba*, & *Gallus*. Zietzschmann, O. 1908.

MUCOSA

Including references to the "lining of the stomach."

General. *Struthio*. Brock, G. T. 1925.

Boundary zone between gizzard and duodenum. *Anas*, *Columba*, & *Gallus*. Zietzschmann, O. 1908.

Epithelium. Altmann's granules. Includes *Columba* & *Gallus*. Hirano, K. 1926a.

Leukocytes in gastric mucosa. *Columba* & *Gallus*. Hirano, K. 1926b.

Musculature

General. *Columba*, *Cypselus*, & *Larus*. Oppel, A. 1895. *Passer*. Bertacchini, P. 1900.

Cytology. *Gallus*. Balli, R. 1907.

Histogenesis. *Gallus*. Balli, R. 1907.

Muscle layers of stomach. Many species. Oppel, A. 1895; Soli, U. 1906.

Physiology

General. Gröbbels, F. 1930. *Anas*. Doyon, M. 1894a. Includes *Anas*. Keeton, R. W., Koch, F. C., & Luckhardt, A. B. 1920. *Buteo*. Mangold, E. 1911a. *Columba*. Doyon, M. 1894a. Corvidae. *Mangold, E. 1911b. *Gallus*. Doyon, M. 1894a; Mangold, E. 1910a; Rossi, G. 1904, 1905. *Passer*. Doyon, M. 1894a.

Peristalsis. Action of Vagus nerve. Nolf, P. 1925b.

Relation in size of stomach to diet. Magnan, A. 1912c.

Seasonal changes in adaptation to food. *Larus*. Semper, K. G. 1881.

EXPERIMENTAL STUDIES

General. *Anas*, *Columba*, & *Gallus*. Doyon, M. 1894b.

Peristalsis. Effect of anoxemia and hypercapnia. Nolf, P. 1925a.

Physiology in normal diet and inanition. *Columba*. Braitmaier, H. 1904.

Response of mucosa to gastrin bodies. Includes *Anas*. Keeton, R. W., Koch, F. C., & Luckhardt, A. B. 1920.

OIL FOUND IN STOMACH

Chemical and physical properties. *Fulmarus glacialis*. Rosenheim, O. & Webster, T. A. 1927.

Ejected when bird is frightened. Possible use. *Fulmarus glacialis*. Rosenheim, O. & Webster, T. A. 1927.

Vitamin content. *Australata lessoni*. Leigh-Clare, J. L. 1927.

Proventriculus

In birds, the stomach is divided into a proximal glandular portion, the proventriculus, and a distal muscular grinding portion, the gizzard. In different groups of birds great variability exists in the relation and size and structure of the two, depending on food habits.

General. French, G. H. 1898. *Anas*, *Colymbus*, *Corvus*, *Cypselus*, & *Emberiza*. Bergmann, C. G. 1862b. *Falco*. French, G. H. 1898. *Gallus*, *Pelecanus*, & *Strix*. Bergmann, C. G. 1862b. *Sturnella*. French, G. H. 1898.

Histogenesis. Michalovskij, S. O. 1910.

HISTOLOGY

General. Michalovskij, S. O. 1910.

Anas. Bergmann, C. G. 1862b. *Ardea*. *Cattaneo, G. 1883. *Asio*. *Greschik, J. 1914a. *Buteo*. *Bergmann, C. G. 1862b; *Greschik, J. 1914a. *Columba*. *Cattaneo, G. 1883. *Colymbus* & *Corvus*. *Bergmann, C. G. 1862b; *Greschik, J. 1914a, b. *Cypselus*, *Emberiza*, & *Falco*. *Bergmann, C. G. 1862b. *Gallus*. *Cattaneo, G. 1883; *Greschik, J. 1914a. *Gecinus*. *Cattaneo, G. 1883. *Jynx* & *Lanius*. *Greschik, J. 1914a. *Larus*, *Melopsittacus*, & *Otus*. *Cattaneo, G. 1883. *Pelecanus*, *Strix*, & *Sturnus*. *Bergmann, C. G. 1862b. *Turdus*. *Cattaneo, G. 1883.

Crypts in mucosa. *Pseudotantalus ibis*. Mitchell, P. C. 1895b.

Glands

General. Cazin, M. 1887a. Birds incidental. Oppel, A. 1896.

Anas. Bergmann, C. G. 1862b; Zietzschmann, O. 1908. *Aquila*. Remouchamps, E. 1880. *Buteo*. Bergmann, C. G. 1862b. *Casuarus*. Remouchamps, E. 1880. *Columba*. Nussbaum, M. 1877; Zietzschmann, O. 1908. *Colymbus*, *Corvus*, *Cypselus*, *Emberiza*, *Falco*, & *Pelecanus*. Bergmann, C. G. 1862b. *Rhea*. Remouchamps, E. 1880. *Sturnus* & *Strix*. Bergmann, C. G. 1862b. *Struthio*. Remouchamps, E. 1880.

Development. *Columba*. Nussbaum, M. 1877.

Cytology. Birds incidental. Pilliet, A. H. 1887.

Development. Michalovsky, J. 1911.

Muscle layers. *Columba*, *Cypselus*, & *Larus*. Oppel, A. 1895, 1897.

Functional changes in cells. Many species. *Michalovsky, J. 1909.

Stimulation of formation of gastric juice. *Gallus*. Collip, J. B. 1922.

Gizzard

The muscular portion of the stomach, which is highly developed in many groups of birds that eat hard food.

General. Boulton, W. W. 1864a; Cazin, M. 1888; Retzius, A. A. 1849 (p. 347); Helvetius, J. C. 1721.

Anas. Réaumur, R. A. 1756. *Caloenas nicrobarica*. Germain, R. 1866. *Carpophaga*. Garrod, A. H. 1878a. *Columbidae*. Borelli, G. A. 1752. *Crex pratensis*. Y., A. R. 1832. *Cuculus*. Crisp, E. 1853. *Gallus*. Réaumur, R. A. 1756c. *Globicera pacifera*. Wood, C. A. 1924b. *Meleagris*. Réaumur, R. A. 1756c. *Pezophaps solitarius*. Newton, A. 1878a. *Rallus*. Y., A. R. 1832. *Struthio*. Réaumur, R. A. 1756c.

Development. Cattaneo, G. 1885; *Cornselius, C. 1925.

ANATOMY

General. Garrod, A. H. 1872d; Flower, W. H. 1860. *Alcedo*, *Carduelis*, *Charadrius*, & *Columba*. Bergonzini, C. 1885. *Euphonia*. Steinbacher, G. 1935c. *Gallus*. *Mangold, E. 1906. *Melopsittacus*. Bergonzini, C. 1885.

Form of gizzard. Conditions determining. Many species. Pilliet, A. H. 1894.

HISTOLOGY

General. *Bauer, M. 1901. Many species. *Cornselius, C. 1925; *Curschmann, H. 1866.

Alcedo. Bergonzini, C. 1885. *Anser*. Gebhardt, F. A. 1914; Leydig, F. 1854a. *Ardea*. *Cattaneo, G. 1883. *Asio*. *Greschik, J. 1914a. *Buceros*. Murie, J. 1874a. *Buteo*. *Greschik, J. 1914a, b. *Carduelis*, *Charadrius*, & *Columba*. Bergonzini, C. 1885; *Cattaneo, G. 1883. *Corvus*. *Greschik, J. 1914a, b. *Gallus*. *Cattaneo, G. 1883; *Greschik, J. 1914a. *Gecinus*. *Cattaneo, G. 1883. *Jynx* & *Lanius*. Greschik, J. 1914a. *Larus*. *Cattaneo, G. 1883. *Melopsittacus*. Bergonzini, C. 1885; *Cattaneo, G. 1883. *Otus* & *Turdus*. *Cattaneo, G. 1883. *Passer* & *Tetrao*. Leydig, F. 1854a.

Mucosa

Gland cells. *Anas*, *Columba*, & *Gallus*. Pilliet, A. H. 1886.

Histogenesis. *Anas*, *Columba*, & *Falco*. *Vigorita, D. 1906. *Gallus*. Cazin, M. 1885. *Meleagris*, *Passer*, & *Strix*. *Vigorita, D. 1906.

Histology. General. Cazin, M. 1886a. Includes birds. Bischoff, T. L. 1838. *Anas*. *Vigorita, D. 1906; Zietzschmann, O. 1908. *Anser*. Gröbbels, F. 1924a. *Columba*. Gröbbels, F. 1924a; *Vigorita, D. 1906; Zietzschmann, O. 1908. *Falco*. *Vigorita, D. 1906. *Gallus*. *Vigorita, D. 1906; Zietzschmann, O. 1908. *Meleagris*, *Passer*, & *Strix*. *Vigorita, D. 1906.

Cuticula or lining

Secreted by the epithelium of the mucosa.

General. *Calaenas*. Bartlett, A. D. 1860a. *Struthio*. Duerden, J. E. & Brock, G. T. 1924.

Chemical studies. *Gallus*. Hedenius, I. 1892.

Color of cuticula. Gröbbels, F. 1929.

Effect of alcohol. Carlet, G. 1876.

Histology. Capobianco, F. 1902. *Alcedo*, *Ara*, *Chrysotis*, *Columba*, *Fringilla*, & *Loxia*. Cattaneo, G. 1885.

Regurgitation. Many species. McAtee, W. L. 1917g. *Buceros*. Flower, W. H. 1869; Murie, J. 1874a. *Columba*. Tobias, L. 1869. *Merula*. Jäckel, A. J. 1873. *Numenius*. Smith, H. H. 1913. *Plotus*. Bartlett, A. D. 1881. *Steganura paradisea*. Freyberg, —. 1879; *Strix* & *Sturnus*. Tobias, L. 1869. *Sturnus*, *Sturnia*, & *Turdus*. Jäckel, A. J. 1873.

"Villi" or "hairs," described by Cazin, M. 1884 as hardened secretion filaments. Gunn, T. E. 1866b. *Cuculus*. Carus, C. G. 1823; Nitzsch, C. L. 1823; Richter, H. 1823. Lining of hairs said to arise from pigment. *Cuculus*. Heusinger, K. F. 1823.

Muscle tissue

General. Viktoroff, K. R. 1904.

Lack of thick muscular gizzard which other Gallinae have. *Centrocercus urophasianus*. Ridgway, R. 1874.

Structure of muscle fibers. *Chloris*, *Gallus*, & *Passer*. Soli, U. 1906.

PHYSIOLOGY

General. Garrod, A. H. 1872d; Helvetius, J. C. 1721; *Roux, W. 1906; Struck, W. 1915. *Anser* & *Gallus*. *Kato, T. 1914; *Mangold, E. 1906. *Meleagris*. Trébeden, E. 1902.

Effects of experimental diets. *Anas*. Weiss, G. 1901. *Gallus*. Houssay, F. 1901b, 1902c, d.

Feeding experiments had no effect on structure. *Brandes, G. 1896b.

Functional adaptation. *Anser* & *Falco*. *Roux, W. 1906.

Motility

Effects of anoxemia and hypercapnia. Nolf, P. 1925a.

Sympathetic nerve influence. Nolf, P. 1925b.

STONES, GRIT, AND OTHER HARD OBJECTS IN GIZZARD; OCCURRENCE AND FUNCTION

General. Duverney, J. G. & Méry, J. 1733; Herr, O. 1922; Jaekel, H. 1925; Ménégaux, H. A. 1922b; Rey, J. G. 1907b; Sappey, M. P. 1894. *Gallus*. Kaupp, B. F. 1924a; Zaitschek, A. 1904. *Lagopus*. Kolderup, C. F. 1924. *Pezophaps solitarius*. Newton, A. 1878a.

Black metallic powder. *Struthio*. Velsch, G. H. 1673b.

Fate of grit. *Gallus*. Kaupp, B. F. & Ivey, J. E. 1923a.

Feathers. Function. Colymbidae. Wood, N. 1836.

Grit rejected when worn. MacIntyre, D. 1918b.

Pin. *Gallus*. Regnart, N. 1705.

INTESTINE

Book. Text in English. Grew, N. 1681.

Anastomus oscitans. Mitchell, P. C. 1915b. *Ardea*. Jacobaeus, O. 1675b. *Carpophaga*. Viallane, H. 1878a. *Carpophaginae*. Cadow, G. 1933. *Cereopsis novae-hollandiae*. Yarrell, W. 1831a. *Corythaix*. Martin, W. C. 1836a. *Euphones*. Lund, P. W. 1829. *Rhinochaetus jubatus*. Marshall, W. A. 1870. *Struthio*. Hérisant, F. D. 1759.

ANATOMY

General. Grimm, J. D. 1866. *Anser*. Kaiser, H. 1925. *Buteo*. Garnich, E. 1925. *Columba*. Kaiser, H. 1925. *Gal-*

lus. Grimm, J. D. 1866; Krüger, A. 1923.

Bacterial flora of intestine. *Gallus*. Joest, E. 1902.

Effects of experimental feeding. Magan, A. 1910a, 1911b.

Ratio of length to food eaten and to species. Brants, M. A. 1881.

Relative size of intestine in various genera. Custor, J. 1873.

Coils, loops, or convolutions

Some authors attach taxonomic value to these features.

General. *Beddard, F. E. 1911; Gadow, H. F. 1889b. Many species. Hilton, W. A. 1902; Mitchell, P. C. 1896b, 1901c.

Ardeidae & Balaeniceps rex. Mitchell, P. C. 1913a. *Certhidia & Cocomis*. Snodgrass, R. E. 1903. *Colius*. Pycraft, W. P. 1907e. *Euphonia*. Clark, H. L. 1913a. *Geospiza*. Snodgrass, R. E. 1903. *Limicolae*. Mitchell, P. C. 1905. *Notornis*. Benham, W. B. 1899b. *Opisthocomus cristatus*. Mitchell, P. C. 1896a. *Phaeton*. Derscheid, J. M. 1925. *Spheniscidae*. Pycraft, W. P. 1907g.

DEVELOPMENT

Books. Text in German. Goette, A. W. 1867; Wolff, C. E. 1812.

General. Includes birds. Macalister, A. 1877. *Anas*. *Hilton, W. A. 1902; Ludwig, E. 1919; Weber, A. 1902d. *Archilochus*, *Bonasa*, & *Colinus*. *Hilton, W. A. 1902. *Gallus*. Campana, A. 1874; Darest, C. 1891c; *Kersten, A. 1912; Seessel, A. 1877; Wolff, C. F. 1768.

Hind gut. *Anas & Gallus*. Keibel, F. 1921.

Solid stage. *Gallus*. Minot, C. S. 1900b.

Temporary occlusion. *Gallus*. Livini, F. 1910a.

HISTOLOGY, INCLUDING HISTOGENESIS AND HISTOPHYSIOLOGY

General. *Cattaneo, G. 1884; *Clara, M. 1926. Excellent figures. *Greschik, J. 1912.

Anser. Kaiser, H. 1925. *Buteo*. Garnich, E. 1925. *Columba*. *Cloetta, N. 1893; Kaiser, H. 1925. *Corvus*. Gres-

chik, J. 1914b. *Euphonia*. Lund, P. W. 1829. *Gallus*. Grimm, J. D. 1866; Krüger, A. 1923. Includes *Gallus*. Corti, A. 1912. *Lyrurus tetrix*. Schumacher, S. 1925a.

Lymph nodules

General. *Anser*. *Basslinger, J. 1854.

Peyer's patches

General. *Basslinger, J. 1854, 1858a.

Development. *Anas*, *Anser*, & *Gallus*. Retterer, E. & Lelièvre, A. 1910c.

Mucosa

General. Many species. *Clara, M. 1926; *Müller, S. 1922.

Anser. Klug, F. 1892a. *Anser*, *Columba*, *Corvus*, & *Gallus*. Klug, F. 1892b.

Epithelium. Cytology. Greschik, J. 1923. Birds incidental. Golgi, C. 1909. Ciliated epithelium. Transitory in embryos. Eberth, C. J. 1860b, 1862.

Glands. *Clara, M. 1926. Includes *Columba & Falco*. Garel, J. 1879. *Lagopus*. Schumacher, S. 1921.

Absorption

General. *Columba*. Arcangeli, A. 1907. Appearance of intestinal epithelium. *Gallus*. Mingazzini, P. 1901.

VIII

General. Bujard, E. 1906, 1909. Occurrence of villi in large intestine. *Cygnus*. Davy, J. 1849.

Development. *Anas*, *Archilochus*, *Bonasa*, & *Colinus*. *Hilton, W. A. 1902. *Gallus*. Torikata, Y. & Shindo, T. 1923.

Epithelium. Changes during absorption and digestion. *Gallus*. Luca, U. 1904; Mingazzini, P. 1901. *Passer*. Biscossi, A. 1908.

Histology. *Anas*, *Archilochus*, *Bonasa*, & *Colinus*. Hilton, W. A. 1902. *Gallus*. Krüger, A. 1923. *Lagopus*. Schumacher, S. 1921.

Variation in length and in area of mucosa surface. Crampe, H. 1872.

Ceca (Caeca)

General. Calleja, C. 1902. Many species. Meckel, J. F. 1809; Wagner, R. 1837. Include birds. Burgi, O.

1905; Crofts, D. R. 1925; Muthmann, E. 1913.

Alauda. Barron, C. 1867. *Anhinga*. Wetmore, A. 1920d. *Anser*. Peyer, J. C. 1683. *Ardea*. Jacobaeus, O. 1675b. *Casuaris*. Maumus, J. J. 1900. *Chrysococcyx*. Barron, C. 1867. *Columbae*. Garrod, A. H. 1874d. *Gallus*. Browne, T. G. 1922. *Melanitta*. Miller, W. D. 1926. *Oidemia*. Miller, W. D. 1926. *Otis tarda*. Kostanecki, K. 1930. *Penelope*. Yarrell, W. 1833c. *Scolopacinae*. Alpheraky, S. N. 1907. *Trogonidae*. Miller, W. D. 1918.

Development. *Anas*. Lelièvre, A. & Retterer, E. 1910b. *Columba*. Seyfert, F. R. 1897. *Gallus*. *Kersten, A. 1912; Looper, J. B. & Looper, M. H. 1929. Includes *Gallus*. Forssner, H. 1907. *Passer*. Seyfert, F. R. 1897.

Location of ceca. Magnan, A. 1911h. *Otis*. Kostanecki, K. 1930.

Taxonomic value. Mitchell, P. C. 1901c.

Third cecum. *Anas* & *Gallus*. Maumus, J. 1902b.

HISTOLOGY

General. Many species. *Maumus, J. 1902a. Includes birds. *Kostanecki, K. 1926.

Anas. Lelièvre, A. & Retterer, E. 1910b. *Columba*. Calleja, C. 1902; Seyfert, F. R. 1897. *Columbus*. Corti, A. 1906. *Gallus*. Looper, J. B. & Looper, M. H. 1929. *Lyrurus tetriz*. Schumacher, S. 1925a. *Passer*. Seyfert, F. R. 1897. *Tetraonidae*. *Schumacher, S. 1922.

Ciliated epithelium in embryos, transitory. *Anas*, *Gallus*, & *Strigidae*. Eberth, C. J. 1860a.

Lymph nodes. *Anas*, *Anser*, *Gallus*, & *Meleagris*. Eberth, C. J. 1861.

PHYSIOLOGY

Ablation of ceca. *Anas* & *Gallus*. Maumus, J. 1901.

Experimental diet. *Anatidae*. Magnan, A. 1913e.

Function. Includes birds. *Kostanecki, K. 1926. *Gallus*. Morgero, A. 1915.

Secretory function. *Lagopus*, *Tetrao*, & *Tetrastes*. *Schumacher, S. 1922.

Abilgation or ligaturing

General. Maumus, J. 1902c.

Utilization of food in cases of abligated ceca. *Meleagris*. Hunter, J. E., Durant, A. J. & Hogan, A. G. 1930.

Diverticulum ilei (Meckel's diverticulum) present in some birds

General. Lönnberg, A. J. & Jager-skiöld, L. 1890; Macartney, J. 1811.

Involution. *Anas*. Lelièvre, A. & Retterer, E. 1910b.

Taxonomic value. Mitchell, P. C. 1901c.

Transformation into lymphoid tissue. Mitchell, P. C. 1904.

Hind gut

General. Geoffroy St. Hilaire, E. 1822e, 1823d.

Fluctuations of intrarectal pressure. *Gallus*. Shiraki, T. 1925.

Histology. Many fine figures. Many species. *Greschik, J. 1912.

ANATOMY

This section includes only publications which deal with the general anatomy and morphology of birds. References to the structure and morphology of individual organs and systems occur under these topics. See also under **Paleontology**.

Textbooks of comparative anatomy, handbooks, manuals, etc. which include descriptions of bird anatomy. See also under **Paleontology** and **Zoology**.

Text in Danish. Heilmann, G. 1914-15, 1916a; Schiöler, E. L. 1925-31.

Text in English. Allen, H. 1869; Aristotle, —. 1910; Atkinson, J. 1820; Audubon, J. J. 1831-39; Beddard, F. E. 1898b; Beebe, C. W. 1906a; Blumenbach, J. F. 1827; Bourne, G. C. 1902; Bradley, O. C. 1915; Bradley, S. M. 1875; Carus, C. G. 1827; Chauveau, A. & Arloing, S. 1893; Collins, S. 1865; Coues, E. B. 1890, 1903; Evans, A. H. 1909; Evers, P. 1839; Gegenbaur, C. 1878; Grant, R. E. 1841; Harwood, B. K. 1796; Headley, F. W. 1895b; Heilmann, G. 1926; Home, E. 1814-28;

Hudson, W. H. 1895; Hunter, J. 1861; Huxley, T. H. 1864, 1871, 1872; Kaupp, B. F. 1922; Kidd, J. 1824; Kingsley, J. S. 1917; Knowlton, F. H. 1909; MacGillivray, M. 1837-52; Monro, A. 1791; Owen, R. 1835-36, 1866-68; Parker, T. J. 1884; Pycraft, W. P. 1910a; Rees, A. and others 1819; Rolleston, G. 1870; Thomson, J. A. 1923a; Todd, R. B. 1835-59; Ward, M. A. 1874; Wilson, E. A. 1911b; Wilson, S. B. & Evans, A. H. 1890-99; Anon. 1782.

Text in French. Berthelot, S. 1875-76; Bory de Saint-Vincent, J. B. 1822-31; Boubier, M. 1926b; Carus, C. G. 1835; Cuvier, G. L. 1805, 1817; Daudin, F. M. 1800; Hollard, H. 1837; Jammes, L. 1904; Malherbe, A. 1859-62; Milne-Edwards, A. & Grandidier, A. 1879-81; Milne-Edwards, H. 1857-81; Paris, P. 1921; Perrault, C. 1672; Roulé, L. 1892-98; Serres, A. E. 1860a; Straus-Durckheim, H. 1843; Vialleton, L. 1911; Vicq d'Azyr, F. 1805.

Text in German. Aristotle, —. 1868; Bergmann, H. & Leukart, R. 1855; Blumenbach, J. F. 1815; Bütschli, O. 1910; Burmeister, C. H. 1856b; Carus, C. G. 1818, 1834; Carus, C. G., Otto, A. W. & Alton, J. S. 1826-55; Ellenberger, W. & Baum, H. 1926; Engelmann, F. 1928; Floericke, C. E. 1908-13; *Gadow, H. F. 1891d; Gegenbaur, C. 1864-72, 1870, 1874; *Gröbbels, F. 1932-37; Gruber, W. 1879; Gurlt, W. 1879; Hennicke, C. R. & Wedekind, R. 1915; Hilzheimer, M. & Haempel, O. 1913; Kaup, J. J. 1835-37; Kolb, C. 1854; Kuhl, H. 1820; Marshall, W. A. 1895; Meckel, J. F. 1821-28; Merrem, B. 1788; Naumann, J. F. 1905; Nuhn, A. 1875; Oken, L. & Kieser, D. G. 1807; Rathke, M. H. 1862; Schimkewitsch, V. M. 1910; Schmidt, E. O. 1854, 1865, 1882; Schmidt, M. 1870-72; Schneider, J. G. 1784; Schultze, C. A. 1828; Stannius, F. H. 1846; *Stresemann, E. 1927-34; *Tiedemann, F. 1810-14; Wagner, R. 1834-35. Include birds. Siebold, K. T. & Stannius, F. H. 1846; Wiedersheim, R. E. 1883, 1898, 1907.

Good pictures of brain, eye, ear, mouth, heart, & sympathetic nervous system. *Columba*. *Vogt, C. C. & Yung, E. 1888-94.

Text in Latin. Casserius, J. 1601; Illiger, J. K. 1811; Malpighi, M. 1697; Valentini, M. B. 1720; Willughby, F. 1676. *Gallus*. Langly, W. 1674a.

Curious illustrations. Blasius, G. 1681.

Text in Slavic. Lindeman, K. E. 1899.

Text in Swedish. Kolthoff, G. I. & Jägerskiöld, L. 1898; Ringius, G. E. 1874.

General. Albers, J. A. 1900c; Amans, P. C. 1906, 1911c; Beebe, C. W. 1905a; Bergmann, C. G. 1850; Bloch, M. E. 1779; Brendel, F. 1859; Burton, E. 1822; Eyton, T. C. 1841a, b; Forbes, W. A. 1880a, 1881d; Fürbringer, M. 1892a; Garnot, P. 1829; Haskins, C. H. 1921; Hoffmann, J. M. 1722d; Hooke, R. 1679; Huxley, T. H. 1867; Jeffries, J. A. 1883f; Lavocat, A. 1899; Magendie, F. 1822; Muralto, J. 1684; Nitzsch, C. L. & Giebel, C. G. 1862a; Parker, W. K. 1887; Pycraft, W. P. 1900b; Rothschild, L. W. 1901; Schuberth, L. 1841; Shufeldt, R. W. 1883c, 1891e; Vandelli, D. 1765; Verrall, —. 1869; Vicq d'Azyr, F. 1776-78, 1787; Wagner, P. 1898a; Wiedersheim, R. E. 1884. Many species. Lucas, F. A. 1895c; Wolf, J. 1799. Includes birds. Clarke, J. 1701.

ANATOMY AND MORPHOLOGY OF THE FOLLOWING GROUPS AND SPECIES OF BIRDS

Anseriformes

Anatidae. Cornevin, C. E. & Lesbree, F. X. 1894; Crisp, E. 1861. Book. Text in English. Eyton, T. C. 1838. *Anas*. *Gurlt, E. F. 1847-1848; Nitzsch, C. L. & Giebel, C. G. 1862a. Hybrid of *Anas moschata* × *A. boschas*. Yarrell, W. 1832b. *Anser*. Fuld, L. 1816; Nitzsch, C. L. & Giebel, C. G. 1862a. *Anseranas semipalmata*. Miller, W. D. 1919b. *Biziura*. Forbes, W. A. 1882i. *Cereopsis*. Nitzsch, C. L. & Giebel, C. G. 1862a. *Clangula*. Valentini, M. B. 1722. *Cygnus*. Bartholinus, T. 1668, 1742; Bewerlinus, J. J. [1650]; Duverney, J. G. 1733b; Major, J. D. 1666; Nitzsch, C. L. & Giebel, C. G. 1862a; Wedel, G. W. 1671; Yarrell, W. 1830. *Fuligula*. Cabot, S. 1846b.

Anhimidae. *Chauna chavaria*. Crisp, E. 1864b; Mitchell, P. C. 1895a. *Palamedea*. Beddard, F. E. & Mitchell, P. C. 1894; L'Herminier, F. J. 1837.

Apterygiformes

Apterygidae. *Apteryx*. Beddard, F. E. 1899a; *Owen, R. 1838, 1841, 1849, 1879; *Parker, T. J. 1890, 1892a, b.

Caprimulgiformes

Caprimulgidae. Beddard, F. E. 1886d; Slater, P. L. 1866a, b.

Steatornithidae. *Steatornis caripensis*. Humboldt, F. H. 1817, 1841; Müller, J. P. 1842a.

Casuariiformes

Casuariidae. *Casuarius*. Duverney, J. G. 1733b; *Meckel, J. F. 1830; Merrem, B. 1819; Perrault, C. 1733a, g. Book. Text in Latin. Valentini, M. B. 1720. *Casuarius emeu*. Martin, W. C. 1834. *Casuarius galeatus*. Knox, R. 1824c.

Dromiceidae. *Casuarius* [*Dromiceius*]. Knox, R. 1824c, 1832; Wedemeyer, G. 1824. *Dromaeus* [*Dromiceius*]. Duchamp, G. 1853; Harrison, R. 1847. Book. Text in German. Mayer, A. F. 1839.

Charadriiformes

Alcidae. *Brachyrhamphus* & *Synthliborhamphus*. Shufeldt, R. W. 1887a.

Charadrii. Mitchell, P. C. 1905.

Chionidae. *Chionis*. Blainville, H. M. 1836.

Laridae. *Larus*. Valentin, C. B. 1719a.

Rynchopidae. *Rynchops*. Beddard, F. E. 1896a.

Scelopacidae. *Aechmorhynchus cancellatus*. Lowe, P. R. 1927. *Rhynchaea*. Beddard, F. E. 1901b. *Tringa*. Marshall, W. A. 1870.

Ciconiiformes

Ardeidae. *Ardea*. Blasius, G. 1674; Muralto, J. 1687; Valentini, M. B. 1727. Book. Text in Swedish. Ringius, G. E. 1874.

Balaenicipitidae. *Balaeniceps rex*. Beddard, F. E. 1888b; Mitchell, P. C. 1913a.

Ciconiidae. *Anastomus*. Beddard, F. E. 1901e. *Ciconia*. Jacobaeus, O. 1677-79; Limpricht, J. A. 1717; Perrault, C. 1734f; Schelhammer, G. C.

1688. Books. Text in Latin. Valentini, M. B. 1720. Text in Swedish. Ringius, G. E. 1874. *Dissoura*. Beddard, F. E. 1896b.

Phoenicopteridae. *Phoenicopterus*. Owen, R. 1832b; Perrault, C. 1734e.

Scopidae. *Scopus*. Beddard, F. E. 1884.

Threskiornithidae. *Guara alba*. Perrault, C. 1734f. *Platalea*. Perrault, C. 1734d.

Coliiformes

Coliidae. *Colius*. Garrod, A. H. 1876b.

Columbiformes

Columbidae. *Columba*. Borrichius, O. 1671a; Deiters, O. 1856; Harris, E. D. 1868. Books. Text in English. Parker, T. J. 1884; Parker, T. J. & Haswell, W. A. 1897; Rolleston, G. 1870. Text in German. *Vogt, C. C. & Yung, E. 1888-94. Text in Latin. Valentini, M. B. 1720. *Ectopistes migratorius*. Shufeldt, R. W. 1915a. *Turtur*. Hartmann, P. J. 1689g.

Raphidae. *Didus*. Blainville, H. M. 1835.

Colymbiformes

Colymbidae. *Aechmophorus major*. Beddard, F. E. 1896d.

Coraciiformes

Alcedinidae. Mitchell, P. C. 1901b. *Alcedo hispidus*, *Ceryle stellata* & *Dacelo gigas*. Cunningham, R. O. 1870.

Bucerotidae. Beddard, F. E. 1889b. *Buceros cavatus*. Owen, R. 1833. *Bucorvus*. Garrod, A. H. 1876f.

Coraciidae. Wetmore, A. 1919d. *Coracias garrulus*. Nitzsch, C. L. & Giebel, C. G. 1857b. *Leptosoma discolor*. Forbes, W. A. 1880c.

Todidae. Forbes, W. A. 1882l. *Todus*. Clark, H. L. 1913b.

Upupidae. *Upupa epops*. Nitzsch, C. L. & Giebel, C. G. 1857d.

Cuculiformes

Cuculidae. Beddard, F. E. 1885d. *Carpococcyx radiatus*. Beddard, F. E. 1901c. *Cuculus canorus*. Oppel, F. M. 1858. *Geococcyx*. Marshall, M. E. 1907; Shufeldt, R. W. 1886b. *Scythrops*. Beddard, F. E. 1898a.

Musophagidae. *Corythaix* [Turacus]. Blainville, H. M. 1826. Martin, W. C. 1836a. *Corythaix* [Turacus] porphyreolopha. Owen, R. 1834b.

Falconiformes

General. Yarrell, W. 1828b.

Accipitridae. Small hawk. Monro, A. (Pr.) 1781. *Aquila*. Borrichius, O. 1671b; Méry, J. 1732; Muralto, J. 1683a; Perrault, C. 1733e; Anon. 1733b. Books. Text in Latin. Aldrovandus, U. 1610-13; Valentini, M. B. 1720. *Gypaëtus*. Perrault, C. 1734a. *Gypaëtus barbatus*. Nitzsch, C. L. & Giebel, C. G. 1866c. *Haliaeetus*. Text in German. Merrem, B. 1781. *Vultur*. Duverney, J. G. 1733d. *Vultur fulvus*. Nitzsch, C. L. & Giebel, C. G. 1863.

Cathartidae. *Cathartes*. Giebel, C. G. 1857a.

Falconidae. *Falco*. Giebel, C. G. 1857a. *Falco tinnunculus* & *Falco niveus*. Bernstein, H. A. 1859b.

Galliformes

Megapodiidae. Oustalet, J. F. 1880a.

Meleagrididae. *Meleagris*. Perrault, C. 1733f; Anon. 1733b. Books. Text in French. Perrault, C. 1671, 1672.

Numididae. *Numida*. Perrault, C. P. 1733b; Anon. 1733b. Text in Latin. Valentini, M. B. 1720.

Opisthocomidae. *Opisthocomus cristatus*. Garrod, A. H. 1879a; L'Hermier, F. J. 1837; Shufeldt, R. W. 1918a.

Phasianidae. *Gallus*. *Gurlt, E. F. 1847-48; Souba, A. J. 1923. Books. Text in English. Kaupp, B. F. 1922; Monro, A. (Pr.) 1781. Text in Latin. Aldrovandus, U. 1610-13; Fuld, L. 1816; Harvey, W. 1651; Langly, W. 1674a; Valentini, M. B. 1720.

Tetraonidae. Book. Text in Latin. Valentini, M. B. 1720. *Lagopus*. Ray, J. 1706. *Lagopus scoticus*. Book. Text in English. Wilson, E. A. 1911a, b. *Tetrao*. Cavanna, G. 1879; Wurm, W. 1899a. Hybrid *Tetrao*. Yarrell, W. 1830-31. *Urogallus*. Hoffmann, J. M. 1722c.

Gruiformes

General. Hartmann, P. J. 1689e; Mitchell, P. C. 1902.

Aramidae. Shufeldt, R. W. 1916c. *Aramus giganteus*. Mitchell, P. C. 1916a. *Aramus scolopaceus*. Eyton, T. C. 1846.

Cariamidae. *Chunga*. Beddard, F. E. 1889c.

Dicholophidae. *Dicholophus* [Cariama] cristatus. Burmeister, C. H. 1853; Martin, W. C. 1836b.

Gruidae. *Anthropoides virgo*. Perrault, C. P. 1733c. *Balearica pavonina*. Perrault, C. P. 1734b. *Grus*. Maynard, C. J. 1889b. Book. Text in Swedish. Ringius, G. E. 1874.

Heliornithidae. *Heliornis surinamensis*. Beddard, F. E. 1893. *Podica*. Beddard, F. E. 1890c. *Podoa surinamensis*. Giebel, C. G. 1861b.

Mesoenatidae. *Mesites*. Lowe, P. R. 1924; Milne-Edwards, A. 1878a. *Mesoenas*. Lowe, P. R. 1924.

Otididae. *Otis*. Perrault, C. 1733d; Anon. 1733b. *Otis tarda*. Yarrell, W. 1855.

Psophiidae. *Psophia*. Beddard, F. E. 1890e.

Rallidae. *Fulica*. Hoffmann, J. M. 1722a. Book. Text in Swedish. Ringius, G. E. 1874. *Porphyrio*. Perrault, C. 1734g.

Rhynchoetidae. *Rhynchoetus jubatus*. Burckhardt, K. R. 1900; Marshall, W. A. 1870. *Rhynchoetus kagu*. Mitchell, P. C. 1915a.

Turnicidae. *Hemipodius*. L'Hermier, F. J. 1837.

Micropodiformes

Micropodidae. Selater, P. L. 1865b; Shufeldt, R. W. 1892b, 1893a. *Aeronautes*. Marshall, M. E. 1907. *Cypselus*. Bernstein, H. A. 1856. *Cypselus apus*. Nitzsch, C. L. & Giebel, C. G. 1857c.

Trochilidae. Shufeldt, R. W. 1892b, 1893a; Traill, T. S. 1840. *Trochilus colubris*. Crisp, E. 1862b; Wilson, J. 1824.

Passeriformes

General. Blyth, E. 1838b; Nitzsch, C. L. & Giebel, C. G. 1862b.

Acanthisittidae. *Acanthisittia chloris*. Pycraft, W. P. 1905f. *Acanthisittia*. Forbes, W. A. 1882d.

Bombycillidae. *Ampelis* [*Bombycilla*] *garrulus*. Schaanning, H. T. 1917.

Campephagidae. *Coracina scutata*. Burmeister, C. H. 1856a.

Cinclidae. *Cinclus*. Crisp, E. 1865.

Coerebidae. Lucas, F. A. 1895c.

Corvidae. *Corvus cornix*. Jung, R. A. 1858. *Gracula*. Cabot, S. 1851.

Eurylaimidae. *Pseudocalyptomena*. Lowe, P. R. 1931.

Fringillidae. *Loxia coccythraustes*. Szeliga-Mierzewski, W. 1927. *Sicalis*. Clark, H. L. 1914.

Hirundinidae. Shufeldt, R. W. 1898a. *Hirundo rustica*. Hellmann, A. 1856.

Oxyruncidae. *Oxyruncus*. Clark, H. L. 1913b.

Philepittidae. *Philepitta*. Forbes, W. A. 1880a.

Pipridae. *Pipra*. L'Herminier, F. J. 1837.

Sturnidae. *Heteralocha*. Garrod, A. H. 1872c.

Thraupidae. *Rhodinocichla*. Clark, H. L. 1913c. *Spindalis*. Clark, H. L. 1913b.

Timeliidae. *Trochalopteron*. Clark, H. L. 1914.

Pelecaniformes

Anhingidae. *Plotus* [*Anhinga*] *levailanti*. Garrod, A. H. 1878b. *Plotus* [*Anhinga*] *melanogaster*. Beddard, F. E. 1892b. Forbes, W. A. 1882k.

Pelecanidae. *Pelecanus*. Perrault, C. 1734c; Stetter, F. W. 1865. *Pelecanus rufescens*. Martin, W. C. 1835b; Owen, R. 1835.

Phaethontidae. *Phaethon*. Beddard, F. E. 1897b.

Phalacrocoracidae. *Phalacrocorax*. Perrault, C. 1733h, i; Shufeldt, R. W. 1914a.

Sulidae. *Sula*. Maynard, C. J. 1889c.

Piciformes

General. Blyth, E. 1838b.

Bucconidae. Forbes, W. A. 1882b.

Capitonidae. Forbes, W. A. 1882g.

Galbulidae. Forbes, W. A. 1882b.

Indicatoridae. *Indicator*. Selater, P. L. 1870. *Indicator xanthonotus*. Stoliczka, F. 1873.

Picidae. *Melanerpes torquatus*. Shufeldt, R. W. 1888b. *Picus*. Berthold, A. A. 1824; Hoffmann, J. M. 1722b; Nitzsch, C. L. & Giebel, C. G. 1866b; Valentin, C. B. 1719b.

Rhamphastidae. Forbes, W. A. 1882g. *Rhamphastos*. Owen, R. 1832a, 1834a.

Procellariiformes

General. Forbes, W. A. 1882a, n.

Psittaciformes

Psittacidae. Beddard, F. E. & Parsons, F. G. 1893; Duverney, J. G. 1733b; Garrod, A. H. 1876a; Giebel, C. G. 1862; Nitzsch, C. L. & Giebel, C. G. 1862c; Thuet, M. J. 1838; Waller, R. 1694. Book. Text in German. Finsch, O. 1867-68. *Geopsittacus occidentalis*. Murie, J. 1868b. *Nasiterna*. Camerano, L. 1878. *Psittacus*. Jacobaeus, O. 1675a.

Rheiformes

Rheidae. *Rhea*. Martin, W. 1834. Book. Text in German. Mayer, A. F. 1839.

Sphenisciformes

General. Selater, P. L. 1887.

Spheniscidae. *Aptenodytes*. *Watson, M. 1883. *Aptenodytes patagonica*. Reid, J. 1835. *Aptenodytes patagonica*. Jullien, J. 1882. *Pygoscelis*. Waterson, D. & Geddes, A. C. 1909; *Watson, M. 1883. *Spheniscus*. *Watson, M. 1883.

Strigiformes

General. Hoffmann, J. M. 1722d.

Strigidae. Muralto, I. 1683c, d. Book. Text in Latin. Valentini, M. B. 1720. *Bubo*. Marshall, M. E. 1907. *Photodilus*. Beddard, F. E. 1890d. *Scotopelia peli*. Murie, J. 1872g. *Speotyto cunicularia hypogaea*. Shufeldt, R. W. 1889b.

Struthioniformes

Struthionidae. *Struthio*. Bonsdorff, E. J. 1853; Browne, E. 1682, 1779; Duerden, J. E. 1912a; Duverney, J. G. & Méry, J. 1733; Garrod, A. H. 1872d; Garrod, A. H. & Darwin, F. 1872;

Hildebrandt, G. F. 1805; Lowe, P. R. 1928; Macalister, A. 1867; Perrault, C. 1733a; Ranby, J. 1730-31; Rapp, W. L. 1847a; Sloane, H. 1724; Warren, G. 1728; Willich, J. 1547; Anon. 1733b. Books. Text in German. Mayer, A. F. 1839. Text in Latin. Valentini, M. B. 1720.

Trogoniformes

Trogonidae. Clark, H. L. 1918a.

EXTERNAL TOPOGRAPHIC ANATOMY

Many of the publications listed under General and Taxonomic Anatomy include descriptions of external topographic anatomy.

Book. Text in English. Diagram of regions. Chapman, F. M. 1912b.

General. Pycraft, W. P. 1903e. *Gallus*. *Latimer, B. & Osborn, J. A. 1923. *Irrisor*. Strickland, H. E. 1843. *Rhinocetus*. Bennett, G. 1861. *Upupa*. Strickland, H. E. 1843.

Body form. Developmental mechanics. Includes *Gallus*. Book. Text in German. His, W. 1874.

Nomenclature of topographic anatomy in English, German, Italian and Latin. Reichenow, A. 1906.

HISTOLOGY (MICROSCOPIC ANATOMY)

Histologic structure is usually considered in the sections for various organs and systems.

Books. Text in English. Bradley, O. C. 1915.

Text in Estonian. Poliakov, P. A. 1908.

Text in French. Mandl, L. 1838.

Text in German. Gadow, H. F. 1891d; Gurwitsch, A. 1913; *Krause, R. 1922; Möllendorff, W. 1927-30; Schneider, K. C. 1902; Stresemann, E. 1927-34. Many species. *Oppel, A. 1896-97.

General. *Anser* & *Columba*. Leydig, F. 1854a. *Loxia*. Szeliga-Mierzeyewski, W. 1927; Leydig, F. 1854a. *Passer* & *Tetrao*. Leydig, F. 1854a.

Intercellular bridges in epithelium. Birds incidental. Luna, E. 1911.

Pavement epithelium lining. Serous cavities and air sacs. Includes birds. Tourneux, F. & Herman, G. 1876.

INTERNAL ANATOMY

General. Butler, G. W. 1889.

Celom function. Provides means for control of pressure connected with heart and air sac contractions. Jones, F. W. 1913.

Viscera, Anatomy of

General. Grew, N. 1757. Alcidae. Shufeldt, R. W. 1887f. *Carduelis*. Hartmann, P. J. 1689a. *Columba*. Flourens, M. J. 1843a. *Corythaix buffoni*. Martin, W. C. 1836a. *Gallus*. Flourens, M. J. 1843a. Good pictures. Bittner, H. 1925a. *Struthio*. Duerden, J. E. 1912c.

Peritoneum. Includes birds. Anderson, R. J. 1883. Peritoneal folds. Robert, H. L. 1837.

Topographic with cross section figures. Includes *Gallus*. Fleischmann, A. 1924.

TAXONOMIC ANATOMY

Articles discussing bird anatomy primarily from a taxonomic standpoint. Many publications with such a bearing will also be found listed under various organs or regions of the body.

Books. Text in English. Yarrell, W. 1837-43.

Text in Finnish. Mäklin, F. W. 1867.

General. Brandt, J. F. 1840a, c; Forbes, W. A. 1881g; Fürbringer, M. 1883-84, 1884; Gadow, H. F. 1882c, 1891b, 1892; Geoffroy Saint-Hilaire, I. 1825; Herman, O. 1902a; MacLeay, W. S. 1829; Otto, H. 1903; Parker, W. K. 1863. Many species. Reichenow, A. 1877b.

Anseriformes

Anhimidae. *Palamedia chavaria*. Parker, W. K. 1863.

Caprimulgiformes

Steatornithidae. *Steatornis*. L'Hermier, F. J. 1849. *Steatornis caripensis*. Müller, J. 1841.

Casuariiformes

Casuariidae. *Casuarius*. Jouan, H. 1863.

Charadriiformes

Structural diversity correlated with color pattern differences. Lowe, P. R. 1933b.

Ciconiiformes

Phoenicopteridae. *Phoenicopterus*. Gadow, H. F. 1877a; Weldon, W. F. 1883.

Coraciiformes

Leptosomatidae. *Leptosoma discolor*. Selater, P. L. 1865c.

Cuculiformes

Cuculidae. *Crotophaga*. L'Herminier, F. J. 1849.

Galliformes

Opisthocomidae. *Opisthocomus*. Garrod, A. H. 1879a.

Pedionomidae. *Pedionomus*. Gadow, H. F. 1891b.

Gruiformes

Aramidae. *Aramus*. Garrod, A. H. 1876d; L'Herminier, F. J. 1849.

Eurypygididae. *Helias*. L'Herminier, F. J. 1849.

Micropodiformes

Micropodidae. *Micropus*. Garrod, A. H. 1877e.

Passeriformes

General. Blyth, E. 1838b; Forbes, W. A. 1880a; Garrod, A. H. 1877d, 1878d; Wallace, A. R. 1874.

Conopophagidae. *Conopophaga*. Forbes, W. A. 1881a.

Cotingidae. *Rupicola*. L'Herminier, P. J. 1849.

Hirundinidae. *Hirundo*. Garrod, A. H. 1877e.

Paridae. Forbes, W. A. 1881e; Madarász, G. 1881.

Timeliidae. *Eupetes*. Forbes, W. A. 1881d. *Orthonyx*. Forbes, W. A. 1882d.

Piciformes

General. Blyth, E. 1838b.

Procellariiformes

Hydrobatidae. *Thalassidroma*. Forbes, W. A. 1881h.

Psittaciformes

Psittacidae. *Geopsittacus occidentalis*. Murie, J. 1868b. *Nasiterna*. Forbes, W. A. 1880d.

Rheiformes

Rheidae. *Rhea*. Gadow, H. F. 1885.

APPARATUS

See also under **Methods, Poultry culture and Technique**.

Bands. Different types of bands for tagging birds. Tratz, E. P. 1914c.

Brooder for nutrition experiments. *Gallus*. Carrick, C. W. 1926.

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Glass container for study of embryo. Saint-Loup, R. 1891.

Injection apparatus. For early chick embryos. Earle, W. R. 1924.

Mercury manometer used in study of blood circulation and respiration. Barry, M. 1827.

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Sexograph. For indicating sex of eggs. *Gallus*. Lienhart, R. 1921.

Traps. Sunkel, W. 1927. For *Passer*. Dearborn, N. 1910.

Ultramicroscope. Includes *Gallus*. Stuebel, H. 1914.

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Book. Text in English. Abbot, C. G. 1911; Chapman, F. M. 1912b.

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Long Island shore birds. Nichols, J. T. & Harper, F. 1916.

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Study of eagle's nest. *Haliaeetus leucocephalus*. Herrick, F. H. 1924a.

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General. Krantz, J. H. 1874a, b; McCue, J. J. 1898, 1900.

Electric thermostat for incubator. Landois, H. 1881a.

Experimental embryology. Romanoff, A. L. 1929d.

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Acceleration of flight. Huguenard, E. & Magnan, A. 1927.

Eggs. Fatio, V. 1865.

Force used by bird in flying. Cagniard-Latour, —. 1837a, b.

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Electric control of shutter from blind. Bailey, G. A. 1914; Lodge, R. B. 1901.

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TELESCOPE

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Altitude determination of migrating birds. Stebbins, J. 1906.

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See also under **Conservation and Poultry culture**. For diseases of birds, see **Pathology**.

Books on aviculture

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Breeding. Grünhaldt, O. 1885.

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Artificial brooding. Cantelo, W. J. 1874.

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Effects of long captivity. Braun, F. 1917a.

Exportation of wild birds from Russia. Szielasko, A. E. 1896.

Preparation of live birds for shipment. Bartlett, A. D. 1862b.

Rearing from egg. *Charadrius h. hiaticula*. Percival, W. G. 1902b. *Turnix*. Seth-Smith, D. 1907b.

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Sex distinction. Book. Text in English. Butler, A. G. 1907c.

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Winter care. *Colinus*. Duke, H. J. 1904. Foreign birds. Lovell-Keays, L. 1915b; Rattigan, G. 1915.

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Books. Text in English. Andrews, T. 1843; Barnesby, G. J. 1872; Birchley, S. W. 1909; Blakeston, W. A. 1880; Buist, K. A. 1874; Butler, A. G. 1894; Gedney, C. W. 1879; Greene, W. T. 1883, 1891, 1898; Kidd, W. 1856a, b, c; Nash, J. 1824; Norman, H. 1908. British song birds. Nash, J. 1824.

Text in French. Delacour, J. T. 1925; Fleuriot, C. 1882.

Text in German. Achtermann, C. 1847; Bade, E. 1895, [1902]; Baldamus, A. C. 1903; Bechstein, J. M. 1900; Boecker-Wetzlar, W. 1889; Hohnau, A. L. 1838; Pheyel, J. 1887; Russ, K. F. 1888.

Text in Italian. Manzini, C. 1645.

General. Meyer, O. 1877.

Effects of long extended captivity on behavior and body form. Braun, F. 1917a.

Food. Sauermann, C. 1891a.

Traffic in United States. Olds, H. W. 1906.

CARE, BREEDING, AND TRAINING OF CANARIES (*Serinus*) AND RELATED SPECIES

Books. Text in Dutch. Noorduyn, C. L. 1907b.

Text in English. Barnesby, G. J. 1872; Blakeston, W. A. 1880; Greene, W. T. 1898; Hervieux de Chanteloup, J. C. 1718; Kidd, W. 1854; St. John, C. W. 1911; Smith, F. 1872; Syme, P. 1823; Tavistock, M. 1929; Wallace, R. L. 1884.

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General. Bibrack, H. 1922.

Canary training. Blanchon, H. L. 1900.

Establishing of pure canary stock. Brandner, O. 1886.

PARROTS AND PARAKEETS (PSITTACIDAE)

Books. Text in English. Greene, W. T. 1883-87; Lauder, T. D. & Brown, T. 1835; Page, C. N. 1906; Russ, K. F. 1884, 1898; Seth-Smith, D. 1902-03; Tavistock, M. 1929.

Text in French. Michel, —. 1829.

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General. Callenbach, E. W. & Murphy, R. R. 1932; Krüger, —. 1884; Olds, H. W. 1910b; Simpson, G. M. 1914.

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Hybrid pheasants. Huët, L. 1889.

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Books. Text in English. Douglass, A. 1881; Mosenthal, J. & Harting, J. E. 1879.

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General. Bell, R. 1898; Cairnes, J. E. 1914; Charon, P. 1911; Douglass, A. 1905, 1906; Duerden, J. E. 1907c, 1909e, 1918, 1920c; Forest, J. 1895; Forest, N. 1910; Gurney, J. H., Jr. 1872b; Hardy, J. 1860; Hennings, C. 1905; Herbert, T. J. 1913; Katterns, W. 1901; Lee, A. R. 1911b; Long, A. G. 1913; Ménégaux, H. A. 1907c; Nolte, C. W. 1895; Pickrell, W. 1906; Sheak, W. H. 1923.

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FEATHER INDUSTRY

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Clipping and quilling do not involve cruelty. Duerden, J. E. 1913.

Effect of climatic changes on feather growth. Duerden, J. E. 1907b.

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Growth rate. Duerden, J. E. 1907b. Improvement. Elley, S. 1909.

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Terminology of. Duerden, J. E. 1909b.

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Care of captured young birds by a male parent also in captivity. *Sylvia rubecula*. Snell, F. H. 1857b.

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Anser. Brown, A. E. & Caton, J. D. 1880. *Ardea*. Forest, J. 1901. *Bernicla*. Brown, A. E. & Caton, J. D. 1880. *Craz*. Barthélemy-Lapommeraye, —. 1854. *Dromaeus* [*Dromiceius*]. Le Prestre, F. 1871. *Meleagris*. Caton, J. D. 1877. *Otis*. Aubusson, L. M. 1907a; Eldred, E. J. 1909. *Penelope*. Aubusson, L. M. 1908. *Psittacidae*. Buxton, —. 1901. *Spheniscidae*. Bikkessy, G. 1891. *Tetrao*. Aubusson, L. M. 1907b.

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General. Peal, H. W. 1903; Spallek, W. 1880.

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Of egg of *Dromaeus novae-hollandiae* by *Gallus*. North, A. J. 1890.

Periods and breeding seasons. Weber, H. C. 1876.

BANDING

This section includes publications which refer to tagging or marking birds in order to identify individuals which may be captured later. Most of these cases involve placing an aluminum label band on the leg of a bird which has been trapped or has been caught as a nestling not yet able to fly.

Book. Text in English. Thomson, A. L. 1936a.

Africa. Selater, W. L. 1922.

Asia. Pauri, G. B. 1927. Japan. Uchida, S. 1928.

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Abadie, R. 1925; Ahrens, T. G. 1923; Alexander, H. G. 1923; Besserer, L. 1912, 1913, 1915; Blasius, R. 1907; Blyth, R. O. 1922; Bonomi, A. 1910; Brasil, L. 1910; Braun, M. 1907; Burkitt, J. P. 1924; Christoleit, E. 1911; Clarke, W. E. 1915, 1917, 1918; Daut, K. & Hess, A. 1914, 1917; Drescher, E. 1920; Drost, R. 1925, 1926a, 1927b; Evans, W. 1910; Franz, V. 1911; Gurney, J. H., Jr. 1899b; Härms, M. 1928; Hagen, W. 1912; Haglund, P. A. 1914; Hamel, E. D. 1915; Herman, O. 1908b; Hess, A. 1913, 1920; Jägerskiöld, L. 1914, 1927; Joy, N. H. 1912a, b; Knauer, F. K. 1912a, b, 1914; Lincoln, F. C. 1925b; Lloyd, H. 1925; Lönnberg, A. J. 1925b, 1926c, 1927a; Loos, C. 1914, 1916; Loudon, G. W. 1912; Lucanus, F. K. 1919a, c, 1929; Lühe, M. 1908b; Møller, A. 1926; Mortensen, H. C. 1914; Müller, F. 1911; Noll-Tobler, H. 1914; Palmén, J. A. 1913, 1914a, b, c, d; Parrot, C. P. 1911; Poliakov, G. I. 1910, 1912; Quantz, B. 1925; Rendahl, H. 1919b; Robinson, H. W. 1926, 1937; Rüppell, W. 1937; Schaanning, H. T. 1921; Schenk, J. 1908b; Schnabel, E. 1926; Seilkopf, H. 1915; Skovgaard, P. 1920a, 1921a, 1925e, 1930a, b, c, 1931d, 1932a, b, 1933b; Stoll, F. E. 1915; Stresemann, E. 1911; Sundström, K. E. 1925; Sword, J. 1914; Szeöts, B. 1911, 1912, 1913, 1916, 1917; Thienemann, J. 1902a, 1908a, b, c, d, e, f, 1909c, d, e, f, 1910, 1911a, b, 1913, 1915a, b, 1916, 1917, 1922; Thomson, A. L. 1909, 1911b, 1912, 1913, 1915, 1922a, b, 1923a; Tratz, E. P. 1913a, 1914a, c; Tschusi zu Schmidhoffen, V. 1911b; Välikangas, I. 1926, 1927; van Oort, E. D. 1912a, b, c, 1913a, b, 1923, 1926;

Warga, K. 1924b; Weigold, H. 1913a, b; Witherby, H. F. 1908b, 1909, 1914b; Anon. 1911a, 1913.

Finland. Sundstrom, K. E. 1925.

Iceland. Skovgaard, P. 1930b, c, 1933b.

Spain. Witherby, H. F. 1926a.

North America

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who may also find the section headed
Habits of interest. There is no sharp
line between these two divisions. For
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Sympathy and foster-parentage. Palmer, E. G. 1888.

CAPTIVITY, BEHAVIOR IN

General. Braun, F. 1903. Birds of prey. Müller, C. 1895a. *Bolaurus*. Swain, J. M. 1901. *Coccothraustes vespertina*. Shufeldt, R. W. 1890c. *Ectopistes*. Deane, R. 1896. *Hylocichla*. Owen, D. E. 1897. *Procellaria*. Ticehurst, C. B. 1912b. *Psittacus*. Schjelderup-Ebbe, T. 1922c, 1923b. *Pycnonotus hemorrhous*. Butler, A. G. 1893a. Rhamphastidae. Broderip, W. J. 1825. *Spheniscus*. Townsend, C. H. 1926. *Tyto alba pratincola*. Stoner, E. A. 1922a.

Attitudes in captivity. *Ixobrychus*. Griffith, A. F. 1894.

Combateness in captivity. Fringillidae. Braun, F. 1915b.

Song. Captivity effects. Braun, F. 1917a.

DOCILITY OR TAMENESS

General. Hunter, J. 1868; Walter, A. 1877b. Anseres. Dorrien-Smith, I. 1913. *Bubo v. virginianus*. Baerg, W. J. 1926. *Circus hudsonius*. Shelley,

L. O. 1935. *Larus argentatus*. Strong, R. M. 1923a. *Psaltriparus*. Finley, W. L. 1905.

Capacity for tameness. *Somateria*. Townsend, C. W. 1914.

Not accustomed to man. Laysan Island. Fisher, W. K. 1903b.

Unmolested birds. Distant, W. L. 1900.

When much starved. *Larus ridibundus*. Warren, R. 1896.

Young bird. *Cuculus*. Tuck, J. G. 1889.

EMOTIONS

General. Beebe, C. W. 1903, 1905b; Braun, F. 1911c. *Columba*. *Rouse, J. E. 1906. *Columbae*. Whitman, C. O. 1919a. *Gallus*. Schjelderup-Ebbe, T. 1930. *Psittacidae*. Braun, F. 1911c.

Affection and amity. Brehm, C. L. 1837; Denise, L. 1909; Gadeau de Kerville, H. 1890.

Emotional basis for peep of chick. *Gallus*. Schjelderup-Ebbe, T. 1924b.

Humor. Do birds have sense of humor? Clarke, R. H. 1907.

Instinctive emotional life. *Friedmann, H. 1934b.

Expression of emotions

Book. Text in English. Includes birds. Darwin, C. R. 1872.

General. Includes birds. Grosseteste, W. 1911. *Columbidae*. *Craig, W. 1909a.

Captive birds. Braun, F. 1910.

Effects upon respiration. *Columba*. *Rouse, J. E. 1905.

In song. Bay, J. C. 1894; Bowdish, B. S. 1893.

Reaction to red color. *Ciconia*. Mikolás, K. 1929a.

EMOTIONAL EFFECTS ON COLOR OF SKIN

Naked skin about head. Blushing. *Gallus*. Schjelderup-Ebbe, T. 1916.

When blood supply is cut. Biedermann, R. 1898.

Fear

General. *Ciconia*. Schultz, S. 1677. Young birds. *Anas*. Phillips, J. C. 1912a.

Do birds fear birds of prey instinctively? Bräss, M. 1912a.

Fear when danger threatens nests. Pershouse, S. 1909.

Loss of fear (taming). *Psaltriparus* family. Finley, W. L. 1905.

Reaction to loud noise. *Hirundo*. Midgley, T. 1896.

HYPNOTISM

General. Carlier, W. 1924; Mangold, E. 1910b, 1913; Maxwell, H. 1919; Steiniger, F. 1935. Many species. Patrick, D. M. 1927. Include birds. Baeye, M. H. 1915; Anon. 1915c.

Anser. Prentiss, D. W. 1882. *Athene noctua*. Reisinger, L. 1926b. *Cathartes*. Prentiss, D. W. 1882. *Columba*. Mangold, E. 1913. *Corvus*. Mangold, E. 1910b. *Gallus*. Erhard, H. 1922; Mangold, E. 1910b, 1913; Prentiss, D. W. 1882. Includes *Gallus*. Szyman-ski, J. S. 1912. *Serinus*. Prentiss, D. W. 1882.

Female of *Glaucidium nanum* described as hypnotizing other birds, especially sparrows, after which she pierces the cranium and sucks the brain. Machon, F. 1926.

INSTINCT

Books. Text in English. Howard, H. E. 1935; Morgan, C. L. 1896a, 1900; Morgan, T. H. 1903; Romanes, G. J. 1884; Stanley, E. 1848; Wallace, A. R. 1895. *Columba*, *Molothrus* & *Struthio*. Darwin, C. R. 1859.

Text in French. Gall, F. J. 1810-19; Hémet, F. 1880; Joly, H. 1901.

Text in German. Schneider, K. C. 1909. Birds incidental. Ziehen, G. T. 1914.

General. Argyll, G. D. 1868; Baldwin, J. M. 1896; Basedow, H. 1888b; Bau, A. 1908b; Beebe, C. W. 1903; Blackwall, J. 1831c, 1850; Boon, B. 1906; Brown, W. 1883; Bryant, H. & Pappenheim, S. 1848; Buchanan, G. C. 1896; *Craig, W. 1918; Fricken, W. M. 1862; Gengler, J. 1908a; Gloger, C. W. 1829b; Heckewelder, J. G. 1799; Her-rick, F. H. 1901, 1907a, b, 1908, 1909, 1919; Hildebrandt, H. 1919b; Kenyon, F. C. 1897; Kerhervé, L. B. 1893; Léniez, A. 1876-77; Lovett, E. 1884; Morgan, C. L. 1896c; Noll, F. C. 1876; Oettingen, A. 1886; Pelletier, H. 1880-

81; *Portielje, A. F. 1922; Potts, T. H. 1884b; Schjelderup-Ebbe, T. 1923c, 1924c; Schuster, W. 1902a; Webb, J. 1865; Weismann, F. L. 1878. Many species. Blackwall, J. 1824b; König-Warthaussen, R. 1889; Whittle, C. L. 1923. Include birds. Good, J. M. 1825; Spalding, D. A. 1875, 1902; Whitman, C. O. 1899.

Young birds. Mills, T. W. 1896b; Morgan, C. L. 1896c; Spalding, D. A. 1873.

Agelaius phoeniceus. Scott, W. E. 1904b. *Anas*. Stiebeling, G. C. 1873. *Ardetta involucris*. Hudson, W. H. 1875. *Coccyzus*. Herrick, F. H. 1909, 1910b. *Columba*. Joly, N. 1876. *Columbae*. Whitman, C. O. 1919a. *Corvus*. Caudey, H. 1873. *Cuculidae*. Blackwall, J. 1824a. *Cuculus*. Sardinia, M. S. 1877. *Cygnus*. Home, M. 1899. *Dolichonyx oryzivorus*. Scott, W. E. 1904b. *Fulica a. atra*. Masse, F. 1909a. *Gallinula c. chloropus*. Selby, P. J. 1841b. *Gallus*. Burch, G. J. 1895; Kerhervé, L. B. 1893; Schjelderup-Ebbe, T. 1914, 1924b; Stiebeling, G. C. 1873. Includes *Gallus*. Schmid, B. 1912. *Hirundinidae*. Chateau, E. 1902; La Harpe, J. 1864. *Ionornis martinicus*. Gross, A. O. & Van Tyne, J. 1929. *Lanius*. Miller, A. H. 1931. *Larus*. Dutcher, W. & Baily, W. L. 1903. *Meleagris gallopavo*. Pennant, T. 1781. *Merula migratoria*. Scott, W. E. 1902b. *Pica*. Graves, J. 1884. Incubator chick. Féré, C. 1895k.

Acorn storing. *Melanerpes*. Michael, C. W. 1926.

Allowance for refraction effects of objects under water. *Ardea*. Cassin, J. 1846.

Comparison of instinct in birds and fishes. Berthelot, S. 1875-76.

Development of instinct. *Breed, F. S. 1911; *Kuhlmann, F. 1909. Includes birds. Byrne, J. 1875.

Diving. (See also under Locomotion.) Jewel, L. L. 1915.

Drinking by newly hatched bird. *Gallus*. Elliott, H. W. 1896.

Effect of alcohol on instincts of birds hatched from alcoholized eggs. *Gallus*. Fletcher, J. M., Cowan, E. A., & Arlitt, A. H. 1916.

Familial instinct. Guéniot, —. 1917:

Feeding. (See also under Habits: Feeding.) Hartzell, J. C. 1896; Lucas, F. A. 1896c. Young birds. Mills, T. W. 1896b.

Feigning of death. Include birds. Blyth, E. 1837a; Rabaud, E. 1917. *Struthio*. Duerden, J. E. 1907a.

Feigning of injury to attract from nest or young. Begbie, A. 1909; Dewar, D. 1908a; Donald, C. H. 1908b; Gabrielson, I. N. 1914a. *Vanellus*. Davenport, H. S. 1902; Rivière, B. B. 1902. *Zenaida z. zenaida*. Nice, M. M. 1922.

"Freezing." Remaining motionless when in danger. Arenberg, E. 1911; Masse, F. 1910; Palmer, W. 1909. *Botaurus*. Barrows, W. B. 1913.

Habit compared with instinct in breeding. Watson, J. B. & Lashley, K. S. 1915.

Homing instinct. (See also under Orientation.) Suggested explanation. Gould, G. M. 1888-89. *Columba*. Musy, M. 1911.

Honey guiding. Habit of attracting attention of man and guiding to bee trees. Indicatorinae. Barneby, W. T. 1900; Chapin, J. P. 1924a.

Imitation and instinct compared. Butler, A. G. 1906c. *Turdus*. Boscher, E. 1893.

Impaling prey on thorns. *Lanius*. Watson, J. B. 1910.

Instinct in captivity. Braun, F. 1910.

Killing instinct. Müller, J. W. 1854. Birds in captivity. Hanau, A. 1875. *Falco*. Haggerty, M. E. 1912. Killing young. *Larus argentatus*. Ward, H. L. 1906b.

Male doves reared in isolation. Craig, W. 1914.

Migratory instinct. (See also under Migrations.) Caged wild birds. Emerson, W. O. 1890; Leopold, N. F. 1923; Schürer, J. 1905. *Melospiza*. Nice, M. M. 1933a.

Opening nuts. *Sitta caesia*. Eysell, A. 1911.

Pecking instinct. Lucas, F. A. 1896c. Development. *Gallus*. Shepard, J. F. & Breed, F. S. 1913.

Persistence of instinct of wild bird in domesticity. *Anas*. Meilheurat, V. 1912.

Pouting. *Columba*. Whitman, C. O. 1899.

Tumbling. *Columba*. Whitman, C. O. 1899. *Zenaidura*. Metcalf, M. M. 1925.

Water attraction. Verlaine, L. 1937.

Modifiability in instinct

General. *Gallus*. Shepard, J. F. & Breed, F. S. 1913.

Effect of injection of castrated crows with human urine and placental extract. *Rowan, W. 1932.

Relation of instinct to

Experience. Weissenborn, W. 1838.

Learning to eat, drink, etc. Bumpus, H. C. 1896.

Learningsong and call notes of English sparrows reared by canaries. *Conradi, E. 1905.

Reproductive instinct

General. Brehm, C. L. 1838; Brückner, O. 1911; Dixon, C. 1877.

Gallus. Pézard, A. 1921c. *Hirundinidae*. Chateau, E. 1902. *Molothrus*. Hudson, W. H. 1874a. *Podiceps*. Arundel, W. B. 1905.

Periodic reproductive instinct. *Anas*. Ramé, E. 1904.

BROODING INSTINCT

General. Whitman, C. O. 1899. *Gallinula chloropus*. Lasnier, J. 1910.

Hen brooding and hatching eggs of a kite when placed under her, but deserting them after hatching. Hutchinson, R. F. 1880. (See also under Recognition.)

Heredity. *Gallus*. Goodale, H. D., Sanborn, R., & White, D. 1920.

CASTRATION EFFECTS

General. *Gallus*. Pézard, A. 1924b. *Meleagris*. van Oordt, G. J. & Van der Maas, C. J. 1929.

Treading instinct present in capons. Brooded chicks and cared for them—even clucking. *Gallus*. Goodale, H. D. 1916d.

MATERNAL AFFECTION

General. Raspail, X. 1895b. Wild birds. Orr, H. L. 1899. *Gallus*. Schjelderup-Ebbe, T. 1924b. Capons. *Gallus*. Breton, P. 1889.

Effect of prolactin on maternal instinct. Riddle, O. 1935.

NEST-BUILDING

Book. Text in English. Wallace, A. R. 1895.

General. Allen, J. A. 1878; Argyll, G. D. 1868; Byrne, J. 1875; *Herrick, F. H. 1911; Hubbard, E. 1882; Kenyon, F. C. 1897; König-Warthaussen, R. 1889; Landois, H. 1881b, 1882b. *Seiurus aurocapillus*. Nice, M. M. 1931d.

Experiments in hindering and aiding birds in nest-building. Abbott, C. C. 1883.

Improvement in nest-building. Fitzgerald, J. 1873.

Is nest-building an instinct? Lowne, B. T. 1879.

Nesting. Birds with stoppage of oviduct. *Gallus*. Curtis, M. R. & Pearl, R. 1915.

Vocal instinct

General. Blackwall, J. 1824b, 1850; Braun, F. 1910, 1912a, c, 1915a; Burkitt, J. P. 1922; Butler, A. G. 1892; Conway, C. 1834; Dorno, C. 1924; Gröbbels, F. 1907, *1925a; Voigt, A. 1911; White, W. H. 1836b; Witchell, C. A. 1892. Many species. Christoleit, E. 1927b.

Development of instinct to sing. Braun, F. 1908c. In individual. Craig, W. 1902.

Significance of song. Headley, F. W. 1909.

Song of hand-reared birds reared so they could not hear song of parents. *Agelaius phoeniceus*, *Dolichonyx oryzivorus*, & *Hedymeles ludovicianus*. Scott, W. E. 1904b. *Linota*. Miller, L. H. 1921a. *Sturnella magna*. Scott, W. E. 1904b.

INTELLIGENCE

Publications dealing with the question whether birds may be said to have intelligence.

Books. Text in English. Ealand, C. A. 1921; Howard, H. E. 1935; Menault, E. 1899.

Text in French. Berthoud, S. H. 1891; Hément, F. 1880.

General. Abbott, C. C. 1877; Adams, A. L. 1873; Bignon, F. 1894; Bird, —. 1882; Blackwall, J. 1831c; Butler, A. G. 1909a, 1915; Clarke, R. H. 1906a; Craig, W. 1918; Dodsworth, P. T. 1910b; Donald, C. H. 1910; Gengler, J. 1908a; Greppin, L. 1906; Grubb, J. 1861; *Herrick, F. H. 1910a; Hubbard, E. 1882; Hunt, C. J. 1905; Killermann,

—, 1906; Lanzi, L. 1903; Lorenz, K. 1932; Ménégau, H. A. 1907b; *Porter, J. P. 1910; Radcliffe, H. D. 1909; Spectator, 1873; Wallace, A. R. 1867b; Wilkins, A. 1891; Anon. 1873a. Include birds. Byrne, J. 1875; Menault, E. 1899; Schönbauer, L. 1914.

Anas. Verlaïne, L. 1937. *Carpodacus*. Abbott, C. C. 1877. *Columba*. Hunter, W. S. 1911; Whitman, C. O. 1919a. *Corvus*. Frazar, A. M. 1876; Taber, W. B. 1927. *Corvus corax*. Pleske, T. D. 1916. *Gallus*. Katz, D. & Toll, A. 1923; Kerhervé, L. B. 1893; Kroh, O. & Götz, W. 1926; Rabaud, E. 1904. Gruidae. (Uncritical.) St. Quintin, W. H. 1907. *Hydralector gallinaceus*. Hencke, H. 1901. *Lanius*. Childs, J. L. 1900. *Passer*. Coch, M. 1907; Rabaud, E. 1886. *Perierocotus*. Dodsworth, P. T. 1910a. *Phasianus* & *Pica*. Rabaud, E. 1904. *Poecetes*. Abbott, C. C. 1877. Psittaci. Braun, F. 1911c; Lacaze-Duthiers, H. 1885. *Rallus longirostris crepitans*. Pettingill, O. S. 1938. *Spizella* & *Sturnella*. Abbott, C. C. 1877. *Turdus*. Drew, S. A. 1872.

Ability to distinguish sounds of different pitch and timbre, also to reproduce them. *Psittacus*. Lashley, K. S. 1913.

Counting. Can birds count? Killermann, —, 1906; Noll-Tobler, H. 1919; Rey, J. G. 1905c.

Do birds know how to avoid electric wires? Rossignol, —, 1905.

Feigning injury or death. Does it indicate intelligence? Delamain, J. 1914.

Ideation and instinct compared. Oehlerking, G. 1877.

Inability to select individual fishes for food when they swam in a close mass formation. Allen, W. E. 1920.

Inferior intelligence. *Zenaidura*. Nice, M. M. 1921.

Inferiority of female sex. Snell, F. H. 1858.

Insight. Does bird possess insight in causal relation? Reinke, J. 1921.

Instinct and intelligence compared. Bowen, F. 1846; *Herrick, F. H. 1908, 1910a.

Lack of discrimination in feeding young. Dunlop, E. B. 1912.

Problem solution. Szymanski, J. S. 1922.

Profiting by experience. Porter, J. P. 1904, 1906; Williams, R. 1896. *Columba*. Hunter, W. S. 1911.

Reason. Can birds reason? Butler, A. G. 1915; Littler, F. M. 1903.

Resourcefulness. Labyrinth studies. *Columba*. Hunter, W. S. 1911.

Visual constants. *Gallus*. *Götz, W. 1926.

Association

General. *Columba*. Rouse, J. E. 1906. Psittaci. Hachet-Souplet, P. 1904.

With reference to color. *Melospitacus undulatus*. Bailey, F. W. & Riley, C. F. 1931.

LANGUAGE

Publications dealing with the question of the ability of birds to communicate with each other, especially vocally. See also under **Sound production**.

General. Beebe, C. W. 1903, 1905b; Fénis, F. 1917; Grosseteste, W. 1911; Kerhervé, L. B. 1893; Woodbury, A. M. 1930b. Corvidae. Gerlach, W. 1927. *Gallus*. Burch, G. J. 1895.

Communication by movements and voice. How birds make themselves understood by man. Gadeau de Ker-ville, H. 1903b.

Expression to man of desires and moods. Psittacidae, etc. Raspail, X. 1903e.

Origin and development of language in birds. Rhoads, S. N. 1889.

LEARNING

Publications dealing with the ability of birds to learn.

Books. Text in English. Howard, H. E. 1935. Includes *Gallus*. Thorndike, E. L. 1911.

General. Blanchon, H. L. 1900; Buxbaum, L. 1892; Craig, W. 1918; Götz, W. 1926; Schjelderup-Ebbe, T. 1930; Anon. 1889c. Exotic birds. Delaurier, A. 1881.

Anas. Morgan, C. L. 1894a. *Anous*. *Watson, J. B. 1908. *Gallus*. Grindley, G. C. 1927; Hadley, P. B. 1909a; Köhler, W. 1915; Kroh, O. 1927; Kroh, O. & Götz, W. 1926; Kroh, O. & Scholl, R. 1926. *Garrulus*. Niederreiter, A. 1892. *Hirundo rustica*. Plocq, M. 1915. *Molothrus* & *Passer*. Porter, J. P. 1906.

Phasianus. Peal, S. E. 1895. *Poecetes*. Porter, J. P. 1906. *Psittacidae*. Baldwin, J. M. 1914. *Sterna*. *Watson, J. B. 1908. *Turdus*. Coward, T. A. 1915.

Drink, learning to. *Columbidae*. Craig, W. 1912b.

Multiple choice study of learning. Labyrinth studies. *Columba*. Hunter, W. S. 1911. *Corvus*. Coburn, C. A. & Yerkes, R. M. 1915. *Fringilla*, *Loxia*, *Pyrrhula*, & *Serinus*. Sadovinkova, M. P. 1923a, b. *Streptopelia*. Strong, R. M. 1911b.

Relation of strength of stimulus to rate of learning. *Gallus*. Cole, L. W. 1911.

Speak, learning to. (See also under various sections involving *Corvus*, *Psittacidae*, and *Sturnus vulgaris*.) *Psittacidae*. Braun, F. 1912b, 1923b; Lucanus, F. K. 1923b.

Training of young in nest. Many species. Raspail, X. 1903d. *Butalis grisola*. Raspail, X. 1903b. *Cannabina linota*. Raspail, X. 1904c. *Cuculus*. Raspail, X. 1895a. *Emberiza cirius*. Raspail, X. 1903a. *Emberiza citrinella*. Raspail, X. 1892c. *Ligurinus chloris*. Raspail, X. 1904b. *Passeriformes*. Raspail, X. 1896b. *Pica caudata*. Raspail, X. 1896a. *Prunella modularis*. Raspail, X. 1903c. *Pyrrhula*. Raspail, X. 1899a.

Visual constants. *Götz, W. 1926.

Sing, learning to

General. Bulman, G. W. 1911.

Acquisition of new song. Scott, W. E. 1902a.

Is ability to sing learned or inherited? Christoleit, E. 1927b; Conradi, E. 1905; Hagen, W. 1923.

Learning to sing, by hand-reared birds. *Agelaius phoeniceus* & *Dolichonyx oryzivorus*. Scott, W. E. 1904b. *Sturnella magna*. Scott, W. E. 1904d. *Zamelodia* [*Hedymeles*] *ludoviciana*. Scott, W. E. 1904c, d.

MEMORY

General. Includes birds. Lucanus, F. K. 1924. *Anser*. Anon. 1889a. *Gallus*. Katz, D. & Révész, G. 1908. Schjelderup-Ebbe, T. 1914. *Passer*. Clarke, R. H. 1906b; Porter, J. P. 1904.

Kinesthetic memory. Meise, W. 1933.

Labyrinth studies of memory. *Columba*. Hunter, W. S. 1911.

Rate of learning in relation to strength of stimulus. *Gallus*. Cole, L. W. 1911.

Training studies involving acoustical stimuli. *Columba*. Jellinek, A. 1926.

MIMICRY, MOCKING, AND RELATED TOPICS, USUALLY VOCAL

General. Brown, R. H. 1924; Busch, M. 1877; Butterfield, W. C. 1895a; Cresswell, O. E. 1899; Csörgey, T. 1922; Fabani, C. 1892e, 1894a; Fish, E. E. 1881; Forbes, H. O. 1878; Forrest, H. E. 1924; Gurney, J. H. Jr. 1897b; Hoffmann, B. 1925; Mata, A. B. 1923; Newton, A. 1878b; *Porter, J. P. 1910; Potts, T. H. 1872; S., H. H. 1878; Stadler, H. & Schmitt, C. 1915; Thomson, J. S. 1878; Townsend, C. W. 1924b; Voigt, A. 1901; Witchell, C. A. 1896b, 1900; Young, J. 1878.

Botaurus. Nagy, E. 1916. *Cerchneis*. Burrell, H. 1908. *Coccothraustes vulgaris*. Macpherson, H. A. 1882. *Icterus galbula*. Scott, W. E. 1901. *Mareca penelope*. Shore, A. C. 1924. *Mimus* [*Dumetella*] *carolinensis*. Bailey, S. W. 1912; Dickey, D. R. 1922; Michener, H. & Michener, J. R. 1935; *Whittle, C. L. 1922a. *Phylloscopus*. Meyrick, H. 1908. *Psittacidae*. Raspail, X. 1903e; Schjelderup-Ebbe, T. 1930. *Psittacus*. Lashley, K. S. 1913. *Serinus*. Lauer, H. 1908b. *Sturnus vulgaris*. Bready, M. B. 1929; Thorpe, D. L. 1892. *Turdus*. Butler, A. G. 1902c; Colthrup, C. W. 1924. *Turdus musicus clarkei*. Gordon, A. 1924; Magrath, H. A. 1924; Shore, A. C. 1924; Terras, H. 1924. *Vireo*. Blincoe, B. J. 1924.

Ability to reproduce sounds of different pitch and timbre. Lashley, K. S. 1913.

Imitation of serpent hiss. *Penthestes*. Pickens, A. L. 1928.

List of species mocking. Cretté de Palluel, A. 1903-04.

Sings, whistles, barks, etc. *Chrysotis*. Lashley, K. S. 1913.

MORAL BEHAVIOR

General. Momber, G. A. 1909.

Moral and mental attributes in birds. Butler, A. G. 1909a, b.

"Moral superiority." Corvidae. Horwood, A. R. 1909.

PARENTAL BEHAVIOR

See also under Maternal affection, Instinct.

General. Many species. Brehm, C. L. 1868b.

Parent diving with young under wings when frightened. *Podilymbus p. podiceps*. Strong, R. M. 1912f.

PERCEPTION

Direction perception. (See also under Orientation.) In young. *Gallus*. Thorndike, E. L. 1899.

Discrimination tests. *Corvus*. Curnburn, C. A. 1914.

Distance perception. In young. *Gallus*. Thorndike, E. L. 1899.

Visual pattern-discrimination. Includes *Gallus*. *Johnson, H. M. 1914.

Form, size, and space perception

General. *Gallus*. *Bingham, H. C. 1913; Révész, G. 1925.

Form discrimination. *Gallus*. Kroh, O. 1927; Kroh, O. & Scholl, R. 1926.

Form perception. *Gallus* incidental. Hunter, W. S. 1913; Kroh, O. 1927.

Size perception. *Gallus*. Kroh, O. 1927; Kroh, O. & Götz, W. 1926.

Young. *Gallus*. Thorndike, E. L. 1899.

Space perception

Book. Text in German. Cyon, E. 1908.

General. Includes birds. Tschermak, A. 1914. *Gallus*. Révész, G. 1925.

Function of semicircular canals in space perception. Cyon, E. 1878, 1900b.

PLAY

Books. Text in English. Cornish, C. J. 1896.

Text in German. Groos, K. 1896; Schneider, K. C. 1909.

General. Momber, G. A. 1909; Wurm, W. 1911. Many species. Masse, F. 1909b. Sea birds. Buxbaum, L. 1902. Fringillidae in captivity. Braun, F. 1907a.

Exercise and play. *Curruca*, *Grus*, & *Otus*. Walter, A. 1877a. *Struthio*. Latzel, R. 1914.

Playing-house constructed by *Chlamydera* & *Ptilonorhynchus*. Gould, J. 1840.

REACTIONS TO VARIOUS STIMULI

Color. (See also under Vision: Color vision.) Bierens de Haan, J. A. 1924.

Concealing colors. Henning, H. 1916.

Danger. Artillery fire. Includes birds. Damm, O. 1915.

Heat reaction of young. Birds reacted to heat of lamp as though in sunlight. Falcones. Biedermann-Imhof, R. 1911.

Insects supposed to be bad tasting or offensive. All species were eaten by same species in captivity. Butler, A. G. 1889a, b.

Insects with warning or confusing colors. Krausse, A. H. 1911.

New situations. *Selasphorus*. Du Bois, A. D. 1923a.

Optical stimuli. *Gallus*. *Breed, F. S. 1912.

Phototropism (Attraction to light)

General. Pigot, T. D. 1863; Saxby, H. L. 1863a.

Fire. Kelsall, J. E. 1889. Fire at night. Lano, A. 1895.

Lighthouses. Gurney, J. H. Jr. 1871, 1872a, 1878; Hennicke, C. R. 1914.

Light value (using Weston meter) for leaving and returning to roosting places. *Quiscalus* & *Sturnus vulgaris*. Nice, M. M. 1935.

RECOGNITION OF

Experiments and observations testing ability of birds to recognize familiar objects.

General. Schjelderup-Ebbe, T. 1914.

Nest. Christy, R. M. 1884. *Anous s. stolidus* & *Sterna fuliginosa* [f. *fusca*]. Watson, J. B. & Lashley, K. S. 1915. *Sterna dougalli* & *Sterna hirundo*. Cahn, A. R. 1916.

Parents by offspring. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938.

Self in mirror. Meissner, O. 1908.

Sex. Many species. Noble, G. K. & Vogt, W. 1935. *Colaptes auratus*. Noble, G. K. 1936. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938.

Eggs

General. Butler, A. G. 1878. *Cephus* & *Sphenisciformes*. Ussher, R. J. 1901a.

Does cuckoo know its own egg? Scholey, G. J. 1924.

Number and form of eggs. Gröbels, F. 1908a.

Substituting eggs of other species, or other objects. Butler, A. G. 1878; Christy, R. M. 1884; Drescher, E. 1926; Hilgert, C. 1908, 1926; Hugues, A. 1904; Raspail, X. 1910; Riefkohl, E. 1861. *Accipiter cooperi* & *Gallus*. Williams, R. W. 1896b. *Anous s. stolidus* & *Sterna fuliginosa* [*f. fuscata*]. Watson, J. B. 1908. *Asio f. flammeus* & *Gallus*. Dubois, A. D. 1923b. *Melospiza m. melodia* & *Tyrannus tyrannus*. Strong, R. M. 1891b.

EXPERIMENTAL COLORING OF EGGS

General. Rensch, B. 1925e. *Anous s. stolidus* & *Sterna fuliginosa* [*f. fuscata*]. Watson, J. B. 1908.

Spotting with water-color paints. *Melospiza*, *Sialia* & *Turdus*. Savary, W. B. 1926.

Young

General. *Anous s. stolidus* & *Sterna fuliginosa* [*f. fuscata*]. Watson, J. B. & Lashley, K. S. 1915.

Young interchanged between nests of different species. Christy, R. M. 1884.

SEXUAL BEHAVIOR

Books. Text in English. Chisholm, C. L. 1922; Dixon, C. 1897a; Howard, H. E. 1935. Birds incidental. Wundt, W. M. 1896.

Text in German. Zimmermann, R. 1922. Includes birds. Deegener, B. 1918.

Arctic region birds. Faber, F. 1825-26.

General. Allen, F. H. 1923; Baldwin, S. P. & Kendeigh, S. C. 1927; Braun, F. 1919; Brehm, C. L. 1838; Craig, W. 1918; Csörgy, T. 1922; Curry, A. V. 1890; Cuvier, F. G. 1808; Detmers, E.

1913; Eckstein, K. 1889a; Gifford, E. W. 1927; Grote, G. A. 1909; Hawkins, C. J. 1918, 1920; Huxley, J. S. 1926; Lorenz, K. 1932; Marx, A. 1914; Neumann, C. 1893; Sapošnikov, C. 1915; Schjelderup-Ebbe, T. 1924e; Schuster, L. 1926c; Sherman, A. R. 1924; Tinbergen, N. 1936. Many species. Brehm, C. L. 1840b; Noble, G. K. & Vogt, W. 1935. Tropical birds. Heim, A. 1913.

Agelaius. Gabrielson, I. N. 1915c. *Anas*. Chodziesner, M. 1929; Kempen, C. 1909. *Anas platyrhynchos*. Geyr von Schweppenburg, H. 1924b. *Archilochus alexandri*. Woodbury, A. M. 1930a. *Ardea*. Selous, E. 1925b. *Ardeidae*. Detmers, E. 1907a. *Bonasa*. Stockwell, G. A. 1888. *Botaurus lentiginosus*. Strong, R. M. 1911a. *Caprimulgidae*. Reboussin, R. 1924. *Casarius*. Le Prestre, F. 1871. *Centrocercus* [*Tetrao*] *uropasianellus*. Horsfall, R. B. 1920. *Colaptes auratus*. Noble, G. K. 1936. Includes *Columba*. Enjalbert, J. 1905. *Columbidae*. Varigny, H. C. 1898. *Cuculus*. Gloger, C. W. 1854d. *Cygnus*. Pissot, C. E. 1868. *Dendragapus*. Anthony, A. W. 1903. *Dendroica magnolia*. Nice, M. M. 1926. *Diomedea*. Dill, H. R. 1912. *Dromaeus* [*Dromiceius*]. Le Prestre, F. 1871; Schneider, K. M. 1925. *Galliformes*. Forel, A. 1906. *Gallopavo*. Schjelderup-Ebbe, T. 1924c. *Gallus*. Kempen, C. 1909; Pézard, A. 1921c; Schjelderup-Ebbe, T. 1924c. *Haliaeetus leucocephalus*. Herrick, F. H. 1932. *Jacana*. Miller, A. H. 1930. *Larus*. Dunlop, E. B. 1916. *Meleagris*. Schjelderup-Ebbe, T. 1924c; Stockwell, G. A. 1888. *Melopsittacus*. Cinat-Tomson, H. 1926. *Melospiza melodia*. Nice, M. M. 1933c. *Myiarchus*. Gabrielson, I. N. 1915b. *Oidemia*. Gunn, D. 1923. *Pavo*. Schjelderup-Ebbe, T. 1924c. *Phaethornis*. Davis, T. A. 1934. *Philohela minor*. Mousley, W. H. 1927. *Pica*. Stubbs, F. J. 1909a. *Pipilo e. erythrophthalmus*. Boggs, M. A. 1926. *Podiceps c. cristatus*. Huxley, J. S. 1924b; *Selous, E. 1920. *Podiceps f. fluvialis*. Huxley, J. S. 1919b. *Pygornis*. Davis, T. A. 1934. *Pyrrhocorax*. Zollikofer, E. H. 1927b. *Recurvirostra americana*. Huxley, J. S. 1924a. *Strigiformes*. Brehm, C. L. 1840a. *Telmatodytes p. palustris*. Welter, W. A. 1935. *Tetrao*. Stockwell, G. A. 1888. *Tympanuchus*. Bell, C. N. 1885. *Tyto pratincola*. Potter, J. K. & Gillespie, J. A. 1925. *Vireo*. Boggs, M. A. 1926. *Zenaidura*. Nice, M. M. 1931b. Hybrid of male *Acanthis* and

female hybrid of male *Carduelis* and female *Serinus*. Larcher, O. E. 1866.

Aberration. Skriabina, K. 1908e, 1911b.

Deafness in sexual excitement. (See also under Ear.) *Tetrao urogallus*. Ehrlich, H. 1907.

Fighting. *Tetrao u. urogallus*. Wurm, W. 1899b.

Irregularity in monogamous birds. *Sturnus vulgaris*. Eckardt, W. R. 1919a.

Male stimulating female to lay without copulation. Columbidae. *Craig, W. 1911, 1913c.

Males other than mate pursuing nesting female. *Anas*. Huxley, J. S. 1912b.

Mating of two individuals of same sex. Gloger, C. W. 1860d.

Modification by injection of ovarian extract. *Columba*. Riddle, O. 1914b.

Mutual recognition of sex. Krohn, H. 1924.

Periodic changes in sexual behavior. *Anas*. Ramé, E. 1904.

Revival of sex instinct in autumn. Howe, R. H. 1899.

Sexual behavior when gonads are absent or reduced. Columbidae. Riddle, O. 1925a.

Courtship

Books. Text in English. Chisholm, A. H. 1922; Dixon, C. 1897a; Pycraft, W. P. 1922; Townsend, C. W. 1912b. Includes birds. Poulton, E. B. 1890. *Corvus f. frugilegus*. Yeates, G. K. 1934. *Phalacrocorax auritus*. Lewis, H. F. 1929.

General. Allen, F. H. 1923; Altum, B. 1860a, b; Beebe, C. W. 1903, 1905b; Brehm, C. L. 1835b, 1854a; *Erhard, H. 1923, 1924; Finn, F. 1902f; Huxley, J. S. 1916, 1926; Nice, M. M. 1929c; Noble, G. K. & Vogt, W. 1935; Patten, C. J. 1926; Russow, V. 1871; Selous, E. 1916; Townsend, C. W. 1920, 1925; Wood, T. W. 1871. Many species. Noble, G. K. & Vogt, W. 1935. Includes birds. Marx, A. 1914.

Agelaius. Allen, A. A. 1914b. *Anas*. Brock, S. E. 1914a. *Anas boschas*. Schjelderup-Ebbe, T. 1923a. *Anas creca*. Boase, H. 1925a. Anatidae. Brooks, A. 1920; Townsend, C. W. 1916b; Wormald, H. 1910, 1914. *Anous*. Watson,

J. B. 1908. *Ardea*. Selous, E. 1925a, b. *Argusianus argus*. Seth-Smith, D. 1925. *Bucephala* [*Glaucionetta*]. Boase, H. 1924b. *Calidris*. Verwey, J. 1930. *Cassidix mexicanus major*. Townsend, C. W. 1927. *Centrocercus*. Bond, F. 1900. *Ceriornis*. Bartlett, A. D. 1864. *Ceriornis satyra*. Smith, C. B. 1912. *Clangula*. Brewster, W. 1911b; Townsend, C. W. 1910. *Colaptes auratus luteus*. *Noble, G. K. 1936. *Columba*. Townsend, C. W. 1915. *Columbae*. Butler, A. G. 1898a; Finn, F. 1901b; Whitman, C. O. 1919a. *Colymbus stellatus*. *Huxley, J. S. 1923. *Corvus b. brachyrhynchos*. Townsend, C. W. 1927. *Cuculus*. Mackeith, T. T. 1908. *Dendragapus*. Brooks, A. 1926a. *Emberiza*. Kirkman, F. B. 1913. *Emberiza c. citrinella*. Rope, G. T. 1913. *Eriamatura jamaicensis*. Townsend, C. W. 1926a. *Eunetta falcata*. Finn, F. 1915a. *Fulica americana*. Townsend, C. W. 1926a; Wetmore, A. 1920e. *Fuligula baeri*. Millais, J. G. 1902c. *Fulmarus*. Boase, H. 1924a. *Gallopavo* & *Gallus*. Schjelderup-Ebbe, T. 1924c. *Haematopus ostralegus*. *Huxley, J. S. & Montague, F. A. 1925. *Icteridae*. Tyler, W. M. 1923. *Junco*. Gabrielson, I. N. 1911. *Lanius*. Miller, A. H. 1931. *Larus*. Haviland, M. D. 1914a. *Lophophorus*. Rodon, G. S. 1899. *Lophorina superba minor*. Winterbottom, J. M. 1929. *Meleagris*. Schjelderup-Ebbe, T. 1924c. *Mergus*. Brock, S. E. 1912; Colman, H. R. & Boase, H. 1925; Lönnberg, A. J. 1926; Townsend, C. W. 1911b, 1916b. *Motacilla*. Boase, H. 1926a. *Motacilla yarrelli*. Rope, G. T. 1913. *Nycticorax n. hoacili*. Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Nyroca*. Boase, H. 1926b. *Nyroca affinis*. Townsend, C. W. 1927. *Nyrocinæ*. Alford, C. E. 1921. *Oedemia*. Gunn, D. 1927a. *Oedinemus o. oedinemus*. Munn, P. W. 1912. *Oxyechus v. vociferus*. Pickwell, G. B. 1930. *Paradisea*. Crandall, L. S. 1922. *Pavo*. Schjelderup-Ebbe, T. 1932. *Phalacrocorax penicillatus*. Townsend, C. W. 1925. *Podiceps*. Boase, H. 1925c. *Podiceps c. cristatus*. *Huxley, J. S. 1914, 1924c. *Polyplectron cristata*. Seth-Smith, D. 1912a. *Ptilorhis magnifica*. Seth-Smith, D. 1922, 1923. *Richmondia c. cardinalis*. Shaver, J. M. & Roberts, M. B. 1933. *Rostrhamus sociabilis plumbeus*. Townsend, C. W. 1927. *Schlegelia wilsoni*. Winterbottom, J. M. 1928, 1929. *Somateria*. Boase, H. 1925b; Townsend, C. W.

1910. *Sterna*. Watson, J. B. 1908. *Struthio*. Pocock, R. I. 1909. *Telmatorhynchus p. palustris*. Welter, W. A. 1935. *Tetrao urogallus*. Ehrlich, H. 1907. *Totanus calidris*. Huxley, J. S. 1912b. *Tragopan*. Seth-Smith, D. 1927. *Vanellus*. Brock, S. E. 1911; Haviland, M. D. 1915d.

Courting bowers. *Ptilonorhynchidae*. Book. Text in English. Chisholm, A. H. 1935.

Dancing performances by various birds. These are more or less related to courting. *Anser*. Stetter, F. W. 1861. *Burhinus gallarius*. Cleland, J. B. 1908. *Chiroxiphia*. Holt, E. G. 1925. *Colaptes auratus*. Noble, G. K. 1936. *Gallinae*. Stetter, F. W. 1861. *Lophophorus*. Rodon, G. S. 1899. *Struthio*. Cleland, J. B. 1908; Evelyn, F. W. 1908b. *Tringa*. Stetter, F. W. 1861.

Display performances, usually by male in courting female

General. Csörgey, T. 1922. *Argusianus argus*. Seth-Smith, D. 1925. *Calidris*. Verwey, J. 1930. *Cerionis satyra*. Smith, C. B. 1912. *Cicinnurus regius*. Ingram, W. J. 1907. *Emberiza c. citrinella*. Kirkman, F. B. 1913; Rope, G. T. 1913. *Eupodotis*. Garrod, A. H. 1874c. *Lophornis superba minor*. Winterbottom, J. M. 1929. *Motacilla lugubris*. Boase, H. 1926a; Kirkman, F. B. & Masefield, J. R. 1913. *Motacilla yarrelli*. Kirkman, F. B. 1913; Rope, G. T. 1913. *Nycticorax n. hoacili*. Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Otis*. Garrod, A. H. 1874a. *Paradisaea minor*. Ogilvie-Grant, W. R. 1905c. *Paradisaeidae*. Le Souëf, A. S. 1919. *Podiceps*. Boase, H. 1925c. *Polyplectron cristata*. Seth-Smith, D. 1912a. *Ptilorhis magnifica*. Seth-Smith, D. 1922, 1923. *Schlegelia wilsoni*. Winterbottom, J. M. 1928, 1929. *Scolopax*. Bahr, P. H. 1912a. *Taccocua*. Gill, E. H. 1923. *Tetrao urogallus*. Wurm, W. 1911. *Tragopan*. Seth-Smith, D. 1927. *Trochilidae*. Nicholson, E. M. 1931a.

Cerebral decortication effects on courtship behavior. *Columba*. Rogers, F. T. 1920a.

Display by female. *Eunetta falcata*. Finn, F. 1915a.

Drumming. *Bonasa*. Gleason, L. R. 1924; Jones, L. 1905; Scott, D. 1876. *Colaptes auratus*. Noble, G. K. 1936. *Gallinago*. Evans, W. 1889, 1908.

Excellent pictures. *Bonasa*. Hodge, C. F. 1906.

Gonads: effects on courtship behavior. Benoit, J. 1922.

Tail spreading reflex. *Meleagris*. Hill, L. 1910.

Use of crest, wings, and tail. Gadeau de Kerville, H. 1897.

White nuptial plumes, display. *Botaurus lentiginosus*. Brewster, W. 1911a; Strong, R. M. 1911a; Wright, H. W. 1920.

INFLATION

Breast air sacs. *Tachypetes aquilum*. Vigors, N. A. 1830-31b.

Esophagus in booming. *Struthio*. Anon. 1901b.

Lining of cloaca. *Coracopsis vasa*. Slater, P. L. 1884.

Marital relations

General. Miller, L. H. 1919. *Troglodytes*. *Baldwin, S. P. 1921a. *Vireo*. Boggs, M. A. 1926.

Bigamy. *Erithacus phoenicurus*. Wurga, K. 1926.

Copulation. *Anas boschas*. Schjelderup-Ebbe, T. 1922e. *Micropus a. apus*. Laubmann, A. 1916. *Nycticorax n. hoacili*. Noble, G. K., Wurm, M., & Schmidt, A. 1938.

Mates for second brood. Nice, M. M. 1930a.

Matings subsequent to loss of first nesting. Mousley, W. H. 1917c.

Polyandry. *Rhea*. Astley, H. D. 1907. *Turdus merula*. Noack, T. 1910.

Polygamy. Rhoads, S. N. 1890.

Preferential mating. Species with sexes alike in color. Huxley, J. S. 1922.

Rapid remating. *Falco p. peregrinus*. Witherington, G. 1910.

Second brood in spite of loss of male. Eckardt, W. R. 1919a.

Subsequent mating when female was killed. *Buteo vulgaris*. Kempen, C. 1905.

FIDELITY OF MATES

General. *Columba*. Enjalbert, J. 1905.

Constancy of mates (variable) to each other and to territory. *Dumetella*. Gill, G. 1935.

LENGTH OF PERIOD BIRDS REMAIN MATED

Do birds remain mated for life? Law, J. E. 1919; Willard, F. C. 1918. *Anas tadorna*. Momsen, P. C. 1913.

Remaining mated for a number of years. Carpenter, N. K. 1919.

Same pair breeding for two seasons. *Spizella passerina*. Whittle, C. L. 1925.

MATINGS BETWEEN DIFFERENT SPECIES

Intergeneric mating. (See also under Hybrids.) *Streptopelia* & *Columba*. Archibald, C. F. 1894.

Interorder conjugal affection. *Serinus* & *Psittacus*. Debreuil, C. 1899.

Mating inclinations of duck with a fowl. Kempen, C. 1909.

Pairing of two species. *Turdus*. Dobbier, J. K. 1892.

Nuptial flight

Including song flight. *Asio*. Dubois, A. D. 1924. *Calypte*. Hunt, R. 1920b. *Capella delicata*. Hoffmann, R. 1924. *Philohela*. Brewster, W. 1894. *Selasphorus*. Bassett, F. N. 1921b.

TEMPERAMENT

General. *Acanthis* hybrids. Braun, F. 1913a. *Turtur* [*Streptopelia*] *risorius*. Yerkes, R. M. 1915.

Individuality. *Corvus* incidental. Yerkes, R. M. & Yerkes, A. W. 1917.

Relation to singing. Braun, F. 1917b.

UNUSUAL BEHAVIOR

General. Frauenfeld, G. R. 1863b.

Birds as nurses. *Larus*. Oudemans, A. C. 1888.

Entering water voluntarily. *Struthio*. Aplin, O. V. 1894c.

Feeding young of other species. *Chelidonaria* feeding *Hirundo*. Masefield, J. R. 1917.

Feeding of young in nest by young bird from same parents but over two months older. Columbidae. Snell, F. H. 1857b.

Male incubating eggs. *Meleagris gallopavo*. Oeldmann, S. 1799.

Otus brooding young of *Colaptes*. Lyon, W. I. 1922c.

Solareclipse, behavior during. Booth, H. B. 1927.

Suicide. Bacmeister, W. 1911.

Swimming. *Columba palumbus*. Macpherson, A. H. 1908.

Transfer of eggs from one nest to another. *Perdix cinerea*. Raspail, X. 1893b.

Unmated male feeding young of normal pair. *Turdus pilaris*. Lönnberg, E. 1929b.

Variability in behavior. *Larus argentatus*. Strong, R. M. 1914.

Behavior of birds with experimental lesions of brain

Decerebellate and decerebrate chicks. *Gallus*. Martin, E. G. & Rich, W. H. 1918.

Decerebrate bird, behavior of. *Columba*. Jolyet, F. 1902; Voit, C. 1868.

Decorticated bird. *Columba*. Rogers, F. T. 1920a.

Education of decerebrate bird. *Columba*. Treves, Z. & Aggazzotti, A. 1901.

Experimental lesions of cerebral cortex and corpus striatum. *Columba*. *Rogers, F. T. 1922a.

VOCAL BEHAVIOR

See also under Sound production.

Cackle of hens, significance of. Kellerman, W. A. 1893.

Singing behavior

General. Braun, F. 1908c, 1909.

Development. Braun, F. 1920.

Migration singing. Baxter, E. V. & Rintoul, L. J. 1914.

Psychological basis of singing. *Gröbels, F. 1910.

Singing of sick and dying birds. Braun, F. 1917c.

WEATHER EFFECTS ON BEHAVIOR

General. Blatz, C. 1907b; Anon. 1899b. *Larus ridibundus*. Rendahl, H. 1913a.

Anticipation of weather changes. Brehm, C. L. 1848; Eckardt, W. R. 1919c, d. *Anser*. Buxbaum, L. 1891.

Songs of birds. Davenport, H. S. 1899; Fowler, W. W. 1899. *Mimus*. Shaver, G. M. & Walker, G. 1930.

Thunder, effects of. Phasianidae. Macpherson, A. H. 1896; Rope, G. T. 1896.

Use of bird behavior in weather forecasting. Altum, B. 1890a; Brehm, C. L. 1848; Wiese, G. 1867a.

BIOCHEMISTRY

This section comprises publications which involve chemical compounds, processes, or treatment; it also includes pharmacology. See also under **Physiology: Metabolism and Nutrition**.

Books. Text in German. Lehmann, C. G. 1850-52; Oppenheimer, K. 1924-30. Birds incidental. Vierordt, H. 1906, p. 385.

General. *Fulmarus glacialis*. Stanford, E. C. 1870.

Amyolytic activity variations. Liver and pancreas. *Columba*. Tiger, R. & Simonnet, H. 1921.

Antagonistic action of potassium and lecithin towards calcium and cholesterol. Histologic study. Includes *Gallus*. Kosaka, K. 1930.

Chemical synthesis. *Gallus*. Bongers, I. A. 1887.

Composition of air in air cells of bones. *Cygnus*. Davy, J. 1849.

Edible swallows' nests. Hirundinidae. *Zeller, H. 1913.

Food: chemical composition. Includes birds. Balland, J. A. 1900.

Heat production in cells. *Anser*. Meyerhof, O. 1912.

Oxidation. *Strix noctua*. Albini, G. 1895c.

Respiration. Includes birds. Regnault, V. & Reiset, J. 1849.

Secretion, gastric. Includes *Anas*. Keeton, R. W., Koch, F. C., & Luckhardt, A. B. 1920.

Sex differences. Variations in reproductive cycle. Riddle, O. & Burns, F. H. 1927.

Toxicity of embryonic extracts; effect on blood pressure. *Gallus*. Roffo, A. H. & López Ramírez, R. 1926.

CHEMICAL SUBSTANCES

Acetylcholine: its action in nervous impulse discharge. Nolf, P. 1922.

Albumin of blood and eggs. Heynshius, A. 1875.

Amino sugar and proteins. Edible birds' nests. Wang, C. C. 1921a, b.

Benzoic acid retention in body. *Gallus*. Jaffé, M. 1877.

Carbon dioxide: production in incubation. Burke, E. 1925.

Dinitrophenol. Calorigenic action in normal and thyroidectomized birds. Columbidae. Riddle, O. & Smith, G. C. 1935.

Ether effects on embryonic cells in tissue culture. *Gallus*. Cash, J. R. 1919.

Fatty acids. Concentration. *Hypochoera* & *Sporaeginthus*. Terroine, E. F. 1914.

Fluorine in feathers. Gautier, A. & Clausmann, P. 1913.

Furfural. Presence in *Gallus*. Jaffé, M. & Cohn, R. 1888.

Glutathione content in tumors and normal tissue. *Gallus*. Kennaway, E. L. & Hieger, I. 1927.

Glycine. Use in diet deficiency in vitamin B. *Columba*. Kon, S. K. 1927a.

Histamine. Action on gastric secretion. *Columba*. Koskowski, W. 1922.

Hydrochloric acid formation in stomach. Includes *Gallus*. Harvey, B. C. & Bensley, R. 1912.

Lecithin. Antagonistic action towards potassium. Kosaka, K. 1930.

Nucleic acid, anti-coagulation properties of. Doyon, M. & Sarvonat, F. 1913.

Nucleoprotein formation. *Gallus*. *Fridericia, L. S. 1912.

Ornithuric acid. Synthesis in bird. Nagara, J. 1930.

Potassium. Antagonistic action towards calcium and lecithin. Kosaka, K. 1930.

Saccharose present in crop. *Columba*. Dulzetto, F. 1927.

Starch in testes. Dareste, C. 1872.

Strontium. *Gallus*. Wheeler, W. P. 1919.

Tyramine. Action in beriberi. *Columba*. Lipschitz, W. 1923.

Volatile salt. Borrichius, O. 1673b.

Adrenalin

Nitrogen and sugar excretion in urine as affected by adrenalin. *Anas* & Anser. Paton, D. N. 1904.

Nitrogenous metabolism as affected by adrenalin. *Anser*. Halliburton, W. D. 1904.

Amino acids

General. *Gallus*. Sendju, Y. 1925.

Aminopropionic acid (alanin). *Columba*. Gaglio, G. 1888.

Content in diet as affecting growth. *Gallus*. Osborne, T. B. & Mendel, L. B. 1916.

Toxicity of α -amino acids for cells of embryo. *Gallus*. Burrows, M. T. & Neymann, C. A. 1917.

Ammonia

Content in developing egg. *Gallus*. Needham, J. 1926b.

Production in embryo. Needham, J. 1926b.

Transformation of ammonia into uric acid. *Gallus*. Schröder, W. 1878-79.

Calcium

Antagonistic action towards potassium. *Gallus*. Kosaka, K. 1930.

Balance of calcium. Parhon, C. 1926.

Calcification in embryo. Relation to lipid metabolism. *Gallus*. Hanes, F. M. 1912.

Calcium carbonate crystals in ear. Huschke, E. 1832a.

Composition of eggs and flesh of laying hens as affected by calcium. Buckner, G. D. & Martin, J. H. 1920.

Content of calcium in blood of laying hens. Hughes, J. S., Titus, R. W., & Smith, B. L. 1927.

Differential effect on growth rate of sexes. *Gallus*. Pearl, R. 1916d.

Fecundity effect of calcium. Massengale, O. N. & Platt, C. S. 1930.

Gout as affected by calcium. *Gallus*. Kionka, H. 1900.

Growth effect of calcium. Bethke, R. M., Kennard, D. C., Kick, C. H., & Zingalian, G. 1929; Massengale, O. N. & Platt, C. S. 1930.

Injection of calcium. Results. Parhon, C. 1926.

Phosphorus-calcium ratio in nutrition. *Gallus*. Hart, E. B. & others 1930b.

Rachitic diet, effects on calcium and phosphorus of blood serum. Massengale, O. N. 1929a.

EGG SHELL CALCIUM

Rôle of calcium of egg shell in development of skeleton in incubation. Delezenne, C. & Fourneau, E. 1918.

Transfer of calcium from shell to embryo. *Gallus*. Buckner, G. D., Martin, J. H., & Peter, A. M. 1925c.

METABOLISM

General. *Gallus*. Wheeler, W. P. 1919.

Assimilation of calcium. Reinsdorf, K. 1880. *Gallus*. Carpiaux, E. 1908.

Availability of calcium and other minerals for bone formation. *Gallus*. Bethke, R. M., Kennard, D. C., & Kik, M. C. 1929.

Cereals and vitamins A and D in calcium metabolism. *Gallus*. King, E. J. & Hall, G. E. 1931.

Irradiated ergosterol effects on calcium metabolism. *Gallus*. Hall, G. E. & King, E. J. 1931.

Sticky embryos. *Gallus*. Byerly, T. C. 1931.

Thymus influence on calcium metabolism. *Gallus*. Soli, U. 1910-11.

UTILIZATION

Calcium, calcium carbonate, and calcium citrate. *Gallus*. Russell, W. C. & MacDonald, F. G. 1929.

Different calcium compounds in egg formation. *Gallus*. Buckner, G. D., Martin, J. H., & Peter, A. M. 1923, 1928.

Carbohydrates

Digestion. *Columba* & *Gallus*. Man- gold, E. 1925.

Metabolism. *Anas*. Fleming, G. B. 1913, 1919. *Gallus*. Needham, J. 1927a, b.

Cholesterin

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Constant content of cholesterin remarkable for species. *Hypochoeris* & *Sporaeoginthus*. Terroine, E. F. 1914.

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Text in Italian. Lussana, F. & Lemoigne, A. 1871 (Birds, 1, 131-137).

Text in Latin. Swedenborg, E. 1740; Wenzel, J. & Wenzel, K. 1812.

General. Bazin, A. 1837; Cuvier, G. L. 1797-98; Küenzi, W. 1918; Plačzek, B. 1910; Schulgin, M. A. 1884; Sömmering, S. T. 1792. Include birds. Byrne, J. 1875; Serres, A. E. 1824.

Anas & *Anser*. Haller, A. 1768b. *Apteryx*. *Craigie, E. H. 1930; Dareste, C. 1856b. *Aquila*. Herrick, C. J. 1893. *Archaeopteryx*. Edinger, T. 1926. *Chlorostilbon* & *Chrysolampis*. *Craigie, E. H. 1928. *Columba*. Hannover, A. 1842. *Colymbus*. Wiederseim, R. E. 1885. *Cypselus apus*. Nitzsch, C. L. & Giebel, C. G. 1857c. *Fringilla coelebs*. Schulgin, M. A. 1884. *Gallus*. Hagenbach, E. 1838; Hannover, A. 1842; Nicolai, T. W. 1812. Includes *Gallus*. Johnston, J. B. 1909a. *Gallus* incidental. Brühl, C. B. 1879. *Hesperornis*. Wiederseim, R. E. 1885. *Hydrochelidon*. Herrick, C. J. 1893. *Meleagris*. Hannover, A. 1842. *Pelecanus* & *Phalohela*. Herrick, C. J. 1893. *Quiscalus*. Beddard, F. E. 1904a. *Rhamphastos toco*. Owen, R. 1834a. *Tringa*. Haller, A. 1768b. *Upupa epops*. Nitzsch, C. L. & Giebel, C. G. 1857d.

Fine pictures of entire brain. *Anas*, *Columba*, *Meleagris*, *Phasianus*, & other species. Guillot, N. 1843. *Spheniscus demersus*. Ingvar, S. 1923, 1924. Lat-

eral dissection figured. *Gallus*. Bernard, C. 1851.

Excellent figures showing dissection of brain and cord with cranial nerves. *Anas*. Harwood, B. K. 1796. *Gallus*. *Nicolai, T. W. 1812.

Metamerism. Tur, J. 1905e. *Gallus*. Rabl, C. 1885; *Weber, A. 1900. Includes *Gallus*. McClure, C. F. 1890. *Phasianus*. Weber, A. 1900.

Reconstruction. Lešer, O. 1911.

Vestibular apparatus. (See also Nucleus of N. vestibularis and Cerebellum.) Includes *Columba*. Winkler, T. C. 1907.

Anatomy

See also under **Anatomy** and **Zoologies**.

General. Flourens, M. J. 1843b; Franke, F. 1812a, b; Gröbbels, F. 1921; Johnston, J. B. 1905; Pappenheim, S. & Bryant, H. 1847; Turner, C. H. 1891, 1892; Vicq d'Azyr, F. 1786.

Anas. *Huber, G. C. & Crosby, E. C. 1929; Stieda, C. H. 1869a. (Dissection view.) Harwood, B. K. 1796. *Anser*. *Meckel, A. 1816; *Stieda, C. H. 1869a. *Apteryx*. *Craigie, E. H. 1930. *Archaeornithes*. Lebzelter, V. 1922. *Chrysolampis mosquitus*. *Craigie, E. H. 1928. *Columba*. Edinger, L. 1902b; Edinger, L. & Wallenberg, A. 1899; *Huber, G. C. & Crosby, E. C. 1929; Münzer, E. & Wiener, H. 1898. *Fringilla coelebs*. Schulgin, M. A. 1884. *Gallus*. *Edinger, L. & Wallenberg, A. 1899; Huber, G. C. & Crosby, E. C. 1929; Klatt, B. 1910; Loewe, L. 1880a; *Stieda, C. H. 1869a. (Crested fowl.) Neumann, F. 1914. *Lampornis*. Craigie, E. H. 1932. *Meleagris*. *Meckel, A. 1816. *Passer*. *Edinger, L. & Wallenberg, A. 1899; *Gage, S. P. 1896; *Huber, G. C. & Crosby, E. C. 1929; *Stieda, C. H. 1869a. *Sylvia* & *Turdus*. Hollaender, P. P. 1917.

COMMISSURES

Phylogeny. Kappers, C. V. & Theunissen, W. F. 1908.

Gudden. *Columba*. Frey, E. 1933; Mayser, P. 1894. *Melopsittacus* & *Passer*. Frey, E. 1933.

Meynert. *Columba*. Mayser, P. 1894.

Posterior. *Columba*. Mayser, P. 1894.

Superior. Includes *Gallus*. Cameron, J. 1903-04.

Corpus callosum

Absence in birds first described. Book. Text in Latin. Willis, T. 1664.

Rudiment present. *Anas* & *Columba*. Osborn, H. F. 1886-87.

Development

See also under **Embryology**.

Books. Text in German. Tiedemann, F. 1816. *Anser* & *Gallus*. Mihálkovics, G. 1877.

Text in Latin. Includes *Gallus*. Wenzel, J. & Wenzel, K. 1812.

General. Haller, B. 1922; Johnston, J. B. 1909a; Mihálkovics, G. 1874, 1875; Mordwilko, A. K. 1897; Pappenheim, S. & Bryant, H. 1847.

Apteryx. Parker, T. J. 1892a, b. *Fringilla*. Boss, K. 1913. *Gallus*. Gage, S. P. 1899; Gräper, L. 1913; Kamon, K. 1906; Klatt, B. 1910; Loewe, L. 1880a; Marshall, A. M. 1878a; Mesdag, T. M. 1909; Sperino, G. 1892. Include *Gallus*. His, W. 1892c; Johnston, J. B. 1909a, b; Loewe, L. 1880a; Reichert, C. B. 1837. *Serinus*. *Fleischmann, A. 1914. *Vanelus*. *Schumacher, O. 1928.

Cerebral hemispheres. *Columba*. M'Kendrick, J. G. 1873. *Gallus*. Frank, G. M. 1925.

Forebrain. Studnicka, F. K. 1893-94.

Grouping of cells in mitosis. *Gallus*. Frank, G. M. 1925.

Herniated brain in crested fowls. *Gallus*. Dareste, C. 1865d; Klatt, B. 1910; Neumann, F. 1914.

Histogenesis of brain. *Anas* & *Gallus*. Marcora, F. 1911.

Metameres. *Gallus*. Rabl, C. 1885.

Paraphysis. *Gallus*. *Dexter, F. 1902.

Paraphysis and epiphysis. *Columba* & *Gallus*. Livini, F. 1905a, 1906b. Includes *Gallus* & *Turdus*. Haller, B. 1922.

Stalked parapeal vesicle. *Struthio*. Duerden, J. E. 1920e.

Supraoptic canal from third ventricle into optic nerves. Includes *Botaurus* & *Gallus*. Tilney, F. 1916.

Histology

General. *Brandis, F. 1893; Hannover, A. 1842. Include histology. Mandl, L. 1838; Turner, C. H. 1891.

Anas. Edinger, L. 1902a. *Apteryx*. *Craigie, E. H. 1930. *Chrysolampis mosquitus*. *Craigie, E. H. 1928; Craigie, E. H. & Brickner, R. M. 1927. *Ciconia*. Craigie, E. H. & Brickner, R. M. 1927. *Columba*. Edinger, L. & Wallenberg, A. 1899; Romano-Prestia, F. 1906. *Ectopistes*. *Romano-Prestia, F. 1906. *Gallus*. Craigie, E. H. & Brickner, R. M. 1927; Edinger, L. 1902a; *Edinger, L. & Wallenberg, A. 1899.

Arteries of the brain. Includes *Gallus*. Book. Text in Latin. Coiter, V. 1573.

Brain structure in hereditary ataxia. *Columba*. Hoshino, T. 1919.

Ependyma and neuroglia. Includes *Gallus*. Retzius, G. 1893a.

Relation in quantity of white and gray matter. Includes *Anser*, *Columba*, & *Struthio*. Hovy, A. J. 1913.

Visual portion of brain. Hannover, A. 1840. *Columba*. Mayser, P. 1894. *Gallus*. *Munk, H. 1883.

BRAIN STEM HISTOLOGY

General. *Gallus*. *Ramón y Cajal, S. 1909. *Passer*. *Edinger, L. & Wallenberg, A. 1899; Sanders, E. B. 1929.

Ganglion cells. Structure and physiology. *Columba*. Schüpbach, P. 1905.

Neuroglia. *Columba* & *Ectopistes*. *Romano-Prestia, F. 1906.

TRACTS OR PATHWAYS

General. Boyce, R. W. & Warrington, W. B. 1899a; Ramón y Cajal, P. 1914. Includes birds. Wallenberg, A. 1922. Many species. Gröbbels, F. 1923.

Anas. Edinger, L. 1895; *Huber, G. C. & Crosby, E. C. 1929; Kalischer, O. 1901; Sanders, E. B. 1929; Wallenberg, A. 1902, 1904, 1906. *Anser*. Wallenberg, A. 1906. *Apteryx*. *Craigie, E. H. 1930. *Chrysolampis* & *Ciconia*. Craigie, E. H. 1928; Craigie, E. H. & Brickner, R. M. 1927. *Columba*. Boyce, R. W. & Warrington, W. B. 1899b; Cosmettatos, G. F. 1903; *Edinger, L. & Wallenberg, A. 1899; Frey, E. 1933; Gröbbels, F. 1924b; *Herrmann, A. 1922; *Huber, G. C. & Crosby, E. C. 1929; Kalischer, O. 1901; *Mayser, H. 1894; Münzer, E. & Wiener, H. 1898; Ramón y Cajal, S.

1908b; *Shimazono, J. 1912; Wallenberg, A. 1898a, b, 1900, 1904, 1906. *Fringilla coelebs*. Schulgin, M. A. 1884. *Gallus*. Bellonci, G. 1883; Boyce, R. W. & Warrington, W. B. 1898, 1899b; Craigie, E. H. & Brickner, R. M. 1927; Edinger, L. 1895; *Gröbbels, F. 1924b; *Herrmann, A. 1922; Huber, G. C. & Crosby, E. C. 1929; Kalischer, O. 1901; Oohata, Y. 1928; Ramón y Cajal, S. 1908b; Sanders, E. B. 1929; *Schroeder, K. 1911; *Shimazono, J. 1912. *Melopsittacus*. Frey, E. 1933. *Parus*. Bellonci, G. 1883. *Passer*. Frey, E. 1933; *Huber, G. C. & Crosby, E. C. 1929; Ramón y Cajal, S. 1908b; Sanders, E. B. 1929; *Shimazono, J. 1912. *Psittacidae*. Huber, G. C. & Crosby, E. C. 1929; Kalischer, O. 1901, 1905. *Sylvia* & *Turdus*. Hollaender, P. P. 1917.

Cerebellospinal tracts. *Gallus*. Kuwabara, T. 1927b.

Isthmostriate or bulbo-striate tracts. Wallenberg, A. 1898c, 1903a.

Olfactory tracts. Münzer, E. & Wiener, H. 1898.

Optic tracts. Includes *Gallus*. Kósaka, K. & Hiraiwa, K. 1915.

Proprioceptive tracts. *Columba*. *Frenkel, B. 1909.

Striofugal tracts. *Gallus*. Oohata, Y. 1928.

Supravestibular tracts. *Columba*. Muskens, L. J. 1927.

Development

General. Includes birds. Edinger, L. 1896b.

Myelin sheaths. *Gallus*. *Schroeder, K. 1911.

Fasciculus longitudinalis dorsalis

General. Ramón y Cajal, S. 1908a. *Columba*. *Wallenberg, A. 1903b.

Vestibular functions. Includes *Columba*, *Larus*, *Strix*, & *Struthio*. Ziba, S. 1911.

Tracts connecting various structures

Optic tectum and red nuclei. Oohata, Y. 1929a.

Thalamus with mammillary bodies. Oohata, Y. 1929b.

Tracts connecting with various structures

Nuc. N. III. Jelgersma, G. 1896.

Commissure of Gudden. Frey, E. 1933.

Optic lobes and retina. Tr. septomesencephalicus. *Columba*. Wallenberg, A. 1898a.

Tectum opticum. *Columba*. Frenkel, B. 1911.

Thalamus. *Anas*, *Columba*, *Gallus*, & *Passer*. *Huber, G. C. & Crosby, E. C. 1929. *Gallus*. Oohata, Y. 1930.

Vestibular nuclei. Includes *Columba*. Winkler, T. C. 1907. Tr. occipito-mesencephalo-bulbaris. *Corvus frugilegus*. Wallenberg, A. 1934.

Nuclei of brain stem, or groups of ganglion cells

General. Sala, G. 1906. *Anas*, *Gallus*, & *Passer*. Sanders, E. B. 1929. *Anas*, *Columba*, *Gallus*, & *Passer*. *Huber, G. C. & Crosby, E. C. 1929. *Apteryx*. *Craigie, E. H. 1930. *Chrysolampis*. *Craigie, E. H. 1928. *Fringilla coelebs*. Schulgin, M. A. 1884.

Nucleus commissurae posterioris. *Sylvia* & *Turdus*. Hollaender, P. P. 1917.

Nucleus cuneatus and nucleus gracilis. Ontogeny. *Ara*, *Cacatua*, *Casuarus*, *Catharistes*, *Colymbus*, *Gallus*, *Pavo*, *Pratincola*, & *Spheniscus*. Zeehandelaar, I. 1921.

Nucleus of fasciculus longitudinalis dorsalis. Birds incidental. Ramón y Cajal, S. 1908a. *Sylvia* & *Turdus*. Hollaender, P. P. 1917.

Nucleus lateralis anterior. Many species. Shiina, J. 1933.

Nucleus ruber. Includes *Ciconia*. Lange, S. J. 1912. *Sylvia* & *Turdus*. Hollaender, P. P. 1917.

Nucleus ruber and Monakow's bundle. *Gallus*. Kuwabara, T. & Oohata, Y. 1927.

Optic nerve connections. Includes birds. Bellonci, G. 1888.

Primary centers for optic nerves. *Gallus*. Shiina, Z. 1929.

CRANIAL NERVE NUCLEI

General. *Brandis, F. 1893; Kreis, E. 1883. Include birds. Calleja, J. 1901; Johnston, J. B. 1905. Birds incidental. Stieda, C. H. 1870a.

Anas. Wallenberg, A. 1904, 1906. *Anser*. Wallenberg, A. 1906. *Apteryx*.

*Craigie, E. H. 1930. *Cacatua* & *Ciconia*.
 Black, D. 1922. *Chrysolampis*. Craigie,
 E. H. 1928. *Columba*. *Gröbbels, F.
 1924b; Wallenberg, A. 1904, 1906.
Fringilla coelebs. Schulgin, M. A. 1884.
Gallus. *Gröbbels, F. 1924b. *Passer*.
 Sanders, E. B. 1929. *Sylvia* & *Turdus*.
 *Hollaender, P. P. 1917.

Change of position. Phylogeny and
 teratology. Includes *Gallus*. Kappers,
 C. U. & Vogt, H. 1908.

Development. *Gallus*. His, W. 1887.

Development of oculomotor and
 trochlear nerve nuclei. *Gallus*. *Biondi,
 G. 1910.

Migrations. Neurobiotaxis. Include
 birds. Kappers, C. U. 1910b, 1928;
 Kappers, C. U. & Vogt, H. 1908. *Caca-*
tua & *Ciconia*. *Black, D. 1922.

Motor nuclei in medulla. Kappers,
 C. U. & Vogt, H. 1908.

Nucleus of *N. abducens* VI

General. Jelgersma, G. 1897.
 Includes birds. Prezuiso, L. 1924.
 Includes *Gallus*. Terni, T. 1922.

Nuclei of *N. acusticus* VIII

General. Kuwabara, T. & Ohata, Y.
 1927; Malesani, A. 1909; Soprana, F.
 1906. *Columba*. Deganello, U. 1899,
 1900, 1905.

Nuclei and connections of *N. acusti-*
cus. *Columba*. Wallenberg, A. 1898b,
 1900.

Nucleus of *N. cochlearis*

General. *Columba*. *Ramón y Cajal,
 S. 1908b; Wallenberg, A. 1898b, 1900.
Gallus. Kuwabara, T. 1928; *Ramón y
 Cajal, S. 1908b. *Passer*. *Ramón y
 Cajal, S. 1908b.

Cytology of ganglion cells. *Gallus*
 & *Passer*. Arione, L. 1923.

Nucleus of *N. vestibularis*

General. Many species. Bartels, M.
 1925. *Columba*. Ramón y Cajal, S.
 1908b; Wallenberg, A. 1900. Includes
Columba. Winkler, T. C. 1907. *Cor-*
vus frugilegus. Wallenberg, A. 1934.
Gallus. Kuwabara, T. 1927a; Ramón
 y Cajal, S. 1908b. *Passer*. Ramón y
 Cajal, S. 1908b.

Degeneration following extirpation of
 semicircular canals. *Columba*. Malesani,
 A. 1909.

Special nucleus of *N. vestibularis*.
 Includes birds. Ramón y Cajal, S.
 1908e.

Nuclei of *N. facialis* VII

General. *Gallus*. Kosaka, K. & Hi-
 raiwa, K. 1908.

Motor nucleus. Phylogeny. Birds in-
 cidental. Kappers, C. U. 1910a.

Nucleus of *N. hypoglossus* XII

General. Includes *Anas*, *Columba*, &
Gallus. Kosaka, K. & Yagita, K. 1903.

Nuclei of *N. oculomotorius* III

General. Jelgersma, G. 1896, 1897.

Development. *Gallus*. *Muñoz
 Urrea, F. 1922.

General visceral nucleus of oculo-
 motor nerve. *Gallus*. Ramón y Cajal, S.
 1909.

Nuclei of *N. trigeminus* V

General. Ansalone, G. 1907. *Anas* &
Columba. Wallenberg, A. 1903, 1904.
Gallus. *Biondi, G. 1913.

Mesencephalic nucleus and tract.
 Wallenberg, A. 1904. Includes *Anas*,
Columba, *Gallus*, & *Passer*. Weinberg,
 E. 1928. Include *Ciconia*. Van Valken-
 burg, C. T. 1911a, c.

Motor nuclei of *N. trigeminus*. In-
 cludes birds. Ramón y Cajal, P. 1904b.

Nucleus of *N. trochlearis* IV

General. Jelgersma, G. 1897.

Nuclei of *N. vagus* X

General. Birds incidental. Kappers,
 C. U. 1908b. *Gallus*. Tricomi Allegra,
 G. 1907. Includes *Gallus*. Kosaka, K.
 1909.

Dorsal motor nucleus of *N. vagus*.
 Includes *Gallus*. Holm, H. 1893.

Physiology, including experimental studies

Books. Text in English. Includes
 birds. Ferrier, D. 1886.

Text in German. *Columba* & *Gallus*.
 Flourens, M. J. 1824.

General. Kalischer, O. 1901; Tre-
 viranus, G. R. 1820; Turner, C. H. 1892.
 Birds incidental. Dewar, J. & M'Kend-
 rick, J. G. 1873.

Anas. Richet, C. R. 1883, 1887.
Anser. Richet, C. R. 1883. *Columba*.
 Boyce, R. W. & Warrington, W. B.
 1899b; Gallerani, G. 1889; Haspel, —.
 1842; Kalischer, O. 1901; M'Kendrick, J.
 G. 1873; Münzer, E. & Wiener, H. 1898;
 Muskens, L. J. 1927. *Gallus*. Boyce,
 R. W. & Warrington, W. B. 1898,
 1899b; Haspel, —. 1842; Kalischer, O.
 1901; Richet, C. R. 1883. *Psittacus*.
 Kalischer, O. 1901.

EFFECTS OF EXPERIMENTAL LESIONS

General. *Columba*. Wallenberg, A.
 1898b. Include *Columba*. Schrader,
 M. E. 1891, 1892.

Diabetic puncture. *Columba*. Bern-
 hardt, M. 1874.

On posture and progression. *Columba*.
 *Langworthy, O. R. 1926.

Optic lobes, nerves, and tracts. *Co-*
lumba. Cosmettatos, G. F. 1900.

Tr. septo-mesencephalicus. Function
 and course. Okata, Y. 1928. *Columba*.
 Wallenberg, A. 1898a.

EXPERIMENTAL EXTIRPATION

General. Include *Columba*. Schrader,
 M. E. 1890, 1891.

Brain and upper cord removed, yet
 bird lived for two days. *Columba*.
 Anon. 1829.

Decerebellation. *Gallus*. Lemoigne,
 A. 1870; Martin, E. G. & Rich, W. H.
 1918.

Destruction of cerebellum. Ves-
 tibular symptoms. *Columba*. Lange,
 B. 1891.

Extirpation of semicircular canal
 apparatus. *Columba*. Soprana, F. 1905.

Labyrinth extirpation. *Columba*. Ni-
 shihata, T. 1927c; Trendelenburg, W.
 E. 1906b.

Decerebration experiments

Book. Text in German. *Columba*.
 Munk, H. 1890.

General. Weymouth, F. W. 1922.
Columba. Bischoff, T. L. 1863; Boeck, —.
 & Le Boeuf, L. 1890; Jolyet, F. 1902;
 Mills, T. W. 1899; Nishihata, T. 1927d;
 Rogers, F. T. 1919a; *Schrader, M. E.
 1888, 1892; Treves, Z. & Aggazzotti, A.
 1901; Voit, C. 1868; Anon. 1829. *Gal-*
lus. Ashcraft, D. W. 1929; Martin,
 E. G. & Rich, W. H. 1918. *Psittacus*.
 Kalischer, O. 1900.

Effects of extirpating motor cortex.
Columba. Sandmeyer, W. 1891, pp.
 224-225.

Progressive ablation. Flight ataxia,
 but co-ordination of legs left. *Columba*.
 Krishaber, M. 1869.

"Recovery of faculties." *Columba*.
 McQuillen, J. H. 1878.

Reflexes of decerebrate birds. Do-
 nath, J. 1910.

Various effects of decerebration

Nystagmus. Includes *Columba*. Ivy,
 A. C. 1919.

On blood pressure and body tempera-
 ture regulation. *Columba*. Rogers,
 F. T. 1920b.

On body temperature and water
 elimination. *Columba*. Rogers, F. T.
 1923, 1924a, b, c.

On temperature regulation. *Colum-*
ba. Corin, G. & Van Beneden, A. 1887.

On thyroid gland function. *Co-*
lumba & *Gallus*. Ceni, C. 1920.

On vision and pupillary reflexes.
Gallus. Noll, A. 1915.

Persistence of motor disorders of
 cerebral origin after ablation of head.
 Dubois, R. 1886, 1895.

Tract lesions

General. *Soprana, F. 1905, 1906.

Effect of tract lesions upon reflexes.
Columba & *Larus*. Gröbbels, F. 1922c.

Temperature variation. *Columba*.
 Ott, I. 1893.

VISUAL CENTER, EXPERIMENTAL STUDIES

General. *Columba*. Musehold, A. 1878.

Degeneration effects of extirpation
 of eyes on optic lobes and other visual
 centers and pathways. *Columba*. Jel-
 gersma, G. 1896.

Degeneration of ganglion cells in
 retina following lesion in primary
 optic centers. Includes *Columba*. Oshi-
 nomi, T. 1930.

Quantitative studies

General. Many species. Gröbbels,
 F. 1921.

Relation of size to body size. Includes birds. Dubois, E. 1914.

Relative size. Jäger, G. 1870.

WEIGHTS

General. Includes birds. Hrdlička, A. 1905. Many species. Warneke, P. 1907-08.

Weight correlations of brain with

Body size. Lapique, L. 1912.

Body weight. Brandt, A. F. 1867; Cope, E. D. & Kingsley, J. S. 1888. Many species. Lapique, L. & Girard, P. 1905, 1906. Includes birds. Dubois, E. 1919b. *Colinus*. Dubois, E. 1919a. *Gallus*. Dubois, E. 1919a; Lapique, L. 1907b, c, d, 1908. *Passer*. Dubois, E. 1919a.

Sex differences in weight. Includes *Passer*. Lapique, L. 1907a.

DIVISIONS

Telencephalon (forebrain)

Book. Text in English. Herrick, C. J. 1924.

General. *Apteryx*. *Craigie, E. H. 1930, 1935a; Hunter, J. I. 1923. *Columba*. Kuhlenbeck, H. 1924; M'Kendrick, J. G. 1873. *Columba* & *Gallus*. *Livini, F. 1905b, 1906a. *Dromiceius*. Craigie, E. H. 1935a, b. *Lampornis*. Craigie, E. H. 1932. *Psittaci*. *Kalischer, O. 1905.

Arteries. Includes birds. Kappers, C. U. 1933.

Cell groups. *Columba*. Kuhlenbeck, H. 1924.

Development. Birds incidental. Edinger, L. 1888; Studnicka, F. K. 1893-94. *Columba*. Kuhlenbeck, H. 1924; *Livini, F. 1905b, 1906a. *Gallus*. Bianchi, V. 1906; *Henrich, G. 1897; *Livini, F. 1905b, 1906a; *Tilney, F. 1915.

Lateral ventricles. *Apteryx*. Craigie, E. H. 1930. *Chrysolampis*. Craigie, E. H. 1928.

Measurements. Bumm, A. 1883.

Morphology. Dennler, G. 1922. Many species. Bumm, A. 1883; *Edinger, L. 1903b; *Rose, M. 1914. Birds incidental. Kappers, C. U. & Theunissen, W. F. 1907.

Phylogeny. Includes birds. Kappers, C. U. & Theunissen, W. F. 1908; Kuhlenbeck, H. 1924.

CEREBRAL CORTEX OR PALLIUM

General. Sala y Pons, C. 1893.

Apteryx. *Craigie, E. H. 1929a, 1935a; Durward, A. 1932. *Casuarus*. *Craigie, E. H. 1935c. *Chrysolampis mosquitos*. Craigie, E. H. 1928. *Columba*. Rogers, F. T. 1922. Include *Columba*. Nakagawa, I. 1890; Neumayer, L. 1895. Includes *Gallus*. Bottazzi, F. 1894. *Lampornis magna*. *Craigie, E. H. 1932.

Cytology. *Gallus*. Marinesco, G. & Minea, J. 1915.

Development. Birds incidental. Edinger, L. 1889b, 1895.

Hippocampus. *Apteryx*. Durward, A. 1932.

Hippocampus and parahippocampus. *Chrysolampis*. Craigie, E. H. 1928. *Dromiceius*. Craigie, E. H. 1935b. *Lampornis*. Craigie, E. H. 1932.

Homologue of mammalian neocortex present. *Apteryx*. Craigie, E. H. 1929b.

Localization in function. Includes *Gallus*. Mills, T. W. 1896a.

Multilaminar structure. *Dromiceius novae-hollandiae*. Craigie, E. H. 1934.

Vascularity. *Apteryx*. Craigie, E. H. 1929b.

White matter on ventral surface of anterior lobe. Includes *Gallus*. Lelut, F. 1830.

CORPUS STRIATUM

General. Bryant, H. & Pappenheim, S. 1848; Kuhlenbeck, H. 1924, 1925. Birds incidental. Herman, W. 1925. Includes birds. Ramström, M. 1912.

Development. *Columba*. Kuhlenbeck, H. 1924, 1925. *Gallus*. Kappers, C. U. 1923; Kuhlenbeck, H. 1924, 1925. Includes *Gallus*. Johnston, J. B. 1909b.

Phylogeny. Kappers, C. U. 1908a; Kappers, C. U. & Theunissen, W. F. 1908.

Physiology. *Columba*. M'Kendrick, J. G. 1873. Includes *Columba*. Munk, H. 1886; *Rogers, F. T. 1922. Decoricated bird. *Columba*. Rogers, F. T. 1919a, 1920a.

Structure. Edinger, L. 1903a. *Anas*, *Columba*, *Gallus*, & *Passer*. *Huber, G. C. & Crosby, E. C. 1929. *Apteryx*. Craigie, E. H. 1930. *Chrysolampis*.

Craigie, E. H. 1928. *Columba*. Edinger, L. 1894; M'Kendrick, J. G. 1873; Rogers, F. T. 1922. *Fringilla coelebs*. Schulgin, M. A. 1884. *Lampornis*. *Craigie, E. H. 1932.

OLFACTORY LOBES AND BULBS

General. Bumm, A. 1883; Ramón y Cajal, S. 1890b.

Histology. Edinger, L. 1903b. *Apteryx australis*. Craigie, E. H. 1930. *Chrysolampis mosquitos [platus]*. Craigie, E. H. 1928. *Lampornis magna*. Craigie, E. H. 1932.

PHYSIOLOGY OF FOREBRAIN, INCLUDING EXPERIMENTAL STUDIES

General. Eckhard, C. 1876; *Kalischer, O. 1905. *Columba*. Schrader, M. E. 1888.

Cerebral cortex

General. Anas. Richet, C. R. 1883. *Columba*. Richet, C. R. 1883; Rogers, F. T. 1919b, 1920a. *Gallus*. Richet, C. R. 1883.

Behavior of decerebrate bird. *Columba*. Nishihata, T. 1927d.

Conditioned reflexes. *Columba*. *Cate, J. 1923.

Experimental lesions. *Columba*. *Rogers, F. T. 1922b.

Extirpation. *Columba*. Rogers, F. T. 1920a. *Psittacidae*. Kalischer, O. 1900.

Functions. Book. Text in German. *Columba*. Munk, H. 1890.

Cortical localization

General. Anas, *Columba*, & *Gallus*. Kalischer, O. 1901. Includes *Gallus*. Mills, T. W. 1896a. *Psittacus*. Kalischer, O. 1901.

Auditory centers. Physiology. Includes *Gallus*. *Munk, H. 1883.

Control of smooth muscle of feathers. Anas. Weber, E. 1906.

Motor area. *Psittacidae*. Couty, L. 1882.

No excitable cortex for upper neurons. *Columba*. Rogers, F. T. 1922b.

Quick component in nystagmus. Includes *Columba*. Ivy, A. C. 1919.

Relation to regulation of body temperature and blood pressure. Experimental. *Columba*. Rogers, F. T. 1920b.

Visual cortex. Edinger, L. 1895, 1896a; Herrick, C. L. 1895. *Columba* & *Gallus*. Oehl, S. C. 1879.

Diencephalon

General. *Apteryx*. Craigie, E. H. 1930. *Gallus*. *Rendahl, H. 1924.

Birds and teleosts compared. *Chrysolampis*. Craigie, E. H. 1928. *Chrysolampis*, *Ciconia*, & *Gallus*. Craigie, E. H. & Brickner, R. M. 1927. *Fringilla coelebs*. Schulgin, M. A. 1884.

Development. *Botaurus* & *Gallus*. Tilney, F. 1915.

Ependymal grooves in roof of diencephalon. Birds incidental. Sargent, P. E. 1903.

Nuclei and fiber paths of diencephalon. *Huber, G. C. & Crosby, E. C. 1929.

Structure. Westphal, K. 1898. Anas, *Columba*, *Gallus*, & *Passer*. *Huber, G. C. & Crosby, E. C. 1929. Includes *Gallus* & *Hirundo*. Galeotti, G. 1897. *Spheniscus*. Ingvar, S. 1924.

EPITHALAMUS

Book. Text in German. Many species. Studnička, F. K. 1905, pp. 210-220.

Pineal body. Birds incidental. Lubbock, J. 1888.

Subcommissural organ, a longitudinal paired tract of epithelium, produced by a modification of the ependymal epithelium in vicinity of pineal recess. *Gallus*. Nicholls, G. E. 1912.

HYPOTHALAMUS

Ganglion ectomammillare. Ansalone, G. 1907.

Infundibulum. *Gallus*. Collin, R. 1926b.

Formation of two successive infundibula independent of hypophysis. *Gallus*. Pfeiffer, C. 1926.

Tuber cinereum. *Gallus* & *Parus*. Bellonci, G. 1883.

METATHALAMUS

Corpus geniculatum. *Columba*, *Melopsittacus*, & *Passer*. Frey, E. 1933.

Lateral geniculate bodies. *Ramón y Cajal, P. 1893, 1904a.

OPTIC CHIASMA

General. *Anser*. *Schulgin, M. A. 1881. *Columba*. Cosmettatatos, G. F. 1900; *Schulgin, M. A. 1881; Singer, J. & Münzer, E. 1889. Includes *Columba*. Singer, J. & Münzer, E. 1889. *Corvus*, *Coturnix*, *Emberiza*, *Gallus*, *Hirundo*, *Otus*, *Passer*, *Phasianus*, *Picus*, *Plectolophus*, *Pyrrhula*, *Strix*, & *Sturnus*. *Schulgin, M. A. 1881. Includes *Strix*. Singer, J. & Münzer, E. 1889.

Structure. *Buteo*, *Columba*, & *Gallus*. Michel, J. 1873.

OPTIC NERVES AND TRACTS

Medial optic tract. *Columba*. Noll, A. 1922; Wallenberg, A. 1898a.

Origin and connections. *Anas*. *Ramón y Cajal, S. 1889a, 1891. *Columba*. Frey, E. 1933; Ramón y Cajal, S. 1889a, 1891. *Fringilla* & *Gallus*. *Ramón y Cajal, S. 1889a, 1891. *Melospittacus*. Frey, E. 1933. *Passer*. Frey, E. 1933; Ramón y Cajal, S. 1889a, 1891.

Primary centers. Many species. Shiina, J. 1933.

Position of accommodation and light-reflex fibers in optic tracts. *Columba*. Noll, A. 1922; Wallenberg, A. 1898a.

THALAMUS

General. Ingvar, S. 1923, 1924; Kühlenbeck, H. 1924, 1925; *Ramón y Cajal, P. 1898, 1904a. Includes birds. Ramström, M. 1912. *Apteryx*. Craigie, E. H. 1930. *Chrysolampis*. Craigie, E. H. 1928. *Columba*. *Gröbbels, F. 1924b. Includes *Gallus*. *Gröbbels, F. 1924b; Kosaka, K. & Hiraiwa, K. 1915.

Effects of experimental lesions. Decerebrate bird. *Columba*. Rogers, F. T. 1919a.

Evolution. Ingvar, S. 1923, 1924.

Phylogeny. Ingvar, S. 1924; Kappers, C. U. 1908a.

Effects of destruction of thalamus

General. *Columba*. Rogers, F. T. & Wheat, S. D. 1921.

Anhydremia and diuresis. Rogers, F. T. 1924b.

Blood pressure. *Columba*. *Rogers, F. T. 1920b.

Carbon dioxide excretion in birds with destruction of optic thalamus. *Columba*. Rogers, F. T. & Wheat, S. D. 1921.

Heat regulation. *Columba*. Rogers, F. T. 1919b; Rogers, F. T. & Lackey, R. W. 1923.

Respiratory exchange. *Columba*. Rogers, F. T. & Lackey, R. W. 1923.

Mesencephalon (midbrain)

Mesencephalon of birds and teleosts compared. Morphology and histology. *Chrysolampis*, *Ciconia*, & *Gallus*. Craigie, E. H. & Brickner, R. M. 1927. *Columba* & *Gallus*. *Gröbbels, F. 1924b.

Phylogeny. Ingvar, S. 1924.

Roof. Homologies with reptiles. *Corvus*. Burekhardt, K. R. 1894.

Structure. Westphal, K. 1898. *Apteryx*. Craigie, E. H. 1930. *Chrysolampis*. Craigie, E. H. 1928.

Structure and development. Includes *Gallus*. Palmgren, A. 1921.

Tracts. Hollaender, P. P. 1917.

OPTIC LOBES

General. *Ramón y Cajal, P. 1898, 1904a. Many species. Schulgin, M. A. 1884. Includes many species. *Treviranus, G. R. 1831a.

Anser. *Schulgin, M. A. 1881. *Columba*. Cosmettatatos, G. F. 1903; *Schulgin, M. A. 1881. *Corvus*, *Coturnix*, & *Emberiza*. *Schulgin, M. A. 1881. *Fringilla coelebs*. Schulgin, M. A. 1884. Includes *Gallus*. Kosaka, K. & Hiraiwa, K. 1915. *Gallus*. Bellonci, G. 1883; Sala, G. 1905, 1906; *Schulgin, M. A. 1881. *Hirundo* & *Otus*. *Schulgin, M. A. 1881. *Parus*. Bellonci, G. 1883. *Passer*, *Phasianus*, *Picus*, *Plectolophus*, *Pyrrhula*, *Strix*, & *Sturnus*. *Schulgin, M. A. 1881.

Central connections (tracts) of nerves. *Gallus* & *Parus*. Bellonci, G. 1883.

Development. *Gallus*. Gehuchten, A. 1892b; Oliver, K. K. 1912; Ris, F. 1898, 1899.

Histology. *Anas*. *Ramón y Cajal, S. 1889a, 1891. *Columba*. *Ramón y Cajal, S. 1889a, 1891; Sala, G. 1905, 1906. *Fringilla*. Ramón y Cajal, S. 1889a, 1891; Sala, G. 1905, 1906. *Gallus*. Ramón y Cajal, S. 1889a, 1891; *Ris, F. 1898, 1899; Sala, G. 1905. *Passer*. *Ramón y Cajal, S. 1889a, 1891; Sala, G. 1905, 1906.

Homologies. Includes *Columba*. Nakagawa, I. 1890.

Nuclei and tracts. Sala, G. 1906. *Anas*, *Gallus*, & *Passer*. Sanders, E. B. 1929.

Origin. *Anas* & *Columba*. *Ramón y Cajal, S. 1889a, 1891.

PHYSIOLOGY OF MESENCEPHALON

General. *Columba*. *Kschischkowski, C. 1911; Martino, G. 1926a.

Chemical stimulation. *Columba*. *Kschischkowski, C. 1911.

Experimental degeneration: optic tract to optic lobes. Includes *Columba*. Singer, J. & Münzer, E. 1890.

Rhombencephalon (hindbrain)

CEREBELLUM

General. Malacarne, V. 1782. Includes birds. Franz, V. 1912b. *Anas* & *Anser*. Reisinger, L. 1916. *Apteryx*. Craigie, E. H. 1930. *Chrysolampis*. Craigie, E. H. 1928. *Columba*. Reisinger, L. 1916; Wallenberg, A. 1900. *Gallus*. Reisinger, L. 1916.

Cerebellum better developed in *Dio-medea* than in other birds. Retzius, A. A. 1855.

Significance of cerebellum. Birds incidental. Edinger, L. 1889a.

Taxonomic treatment of cerebellum. Brandis, F. 1896.

Development

General. Bergman, R. 1924. Include birds. Brun, R. 1925; Ingvar, S. 1918.

Columba. *Cate, J. 1926; *Shimazono, J. 1912. *Gallus*. *Lahousse, E. 1888; *Shimazono, J. 1912. Includes *Gallus*. Palmgren, A. 1921. *Passer*. *Shimazono, J. 1912.

Granule cells. *Gallus*. Arai, S. 1923.

Physiology

General. Include birds. Brun, R. 1925; Estable, C. 1923.

Anas & *Anser*. Schklarewski, A. 1872a. *Columba*. Bremer, F. 1924; Bremer, F. & Ley, R. 1927; *Cate, J. T. 1926; Edinger, L. 1912; *Rijnberk, G. 1925; Schklarewski, A. 1872a. *Gallus*. Schklarewski, A. 1872a.

Localization of function. Brouwer, B. 1913. *Gallus*. Bergman, R. 1926.

Degeneration studies

General. *Columba*. Wallenberg, A. 1898b.

Results of extirpation

General. *Gallus*. Lemoigne, A. 1870; Martin, E. D. & Rich, W. H. 1918.

Functions: relation to semicircular canals. *Columba*. Stefani, A. 1920.

Semicircular canals. *Columba*. Male-sani, A. 1909; Stefani, — & Weiss, —. 1877.

Structure

General. Brouwer, B. 1913; Brun, R. 1925; Frenkel, B. 1909. Include birds. Ingvar, S. 1918; Murphy, C. O. 1900.

Anas. Dennissenko, G. 1877; Reisinger, L. 1916. *Anser*. Reisinger, L. 1916. *Columba*. *Cate, J. 1926; Dennissenko, G. 1877; Friedländer, A. 1898; Reisinger, L. 1916. *Gallus*. Reisinger, L. 1916. Include *Gallus*. Dennissenko, G. 1877; Palmgren, A. 1921.

Fiber tract connections. *Anas* & *Anser*. Reisinger, L. 1916. *Columba*. *Frenkel, B. 1909. *Columba* & *Gallus*. Reisinger, L. 1916.

Projection fibers of cerebellum. *Gallus*. Nakazawa, S. 1930.

Sensory connections. Birds incidental. Edinger, L. 1899.

Tracts. *Anas*. Sanders, E. B. 1929. *Gallus*. *Ramón y Cajal, S. 1908c; Sanders, E. B. 1929. *Passer*. Sanders, E. B. 1929.

Histology

General. Brouwer, B. 1913; Murphy, C. O. 1900. Include birds. Dogiel, A. S. 1896; Estable, C. 1923.

Anas & *Anser*. Reisinger, L. 1916. *Columba*. Cate, J. 1926; Reisinger, L. 1916; *Shimazono, J. 1912. *Gallus*. Ramón y Cajal, S. & Illera, R. 1907; Reisinger, L. 1916; *Shimazono, J. 1912. *Passer*. Ramón y Cajal, S. 1889c; Ramón y Cajal, S. & Illera, R. 1907; *Shimazono, J. 1912.

Nuclei

General. *Anas*. Sanders, E. B. 1929. *Gallus*. *Ramón y Cajal, S. 1908c; Sanders, E. B. 1929. *Passer*. Sanders, E. B. 1929.

Development. *Gallus*. Gentès, L. 1906.

Phylogeny. Includes birds. Ingvar, S. 1918. *Catharistes* [*Coragyps*]. Höevell, J. J. 1916.

Purkinje cells

General. *Columba* & *Ectopistes*. *Romano-Prestia, F. 1906.

Development. *Gallus*. Bergman, R. 1926.

Differences in flying and terrestrial birds. *Gallus*. Marinesco, G. & Minea, J. 1915.

FOURTH VENTRICLE

General. Malacarne, V. 1782. *Columba*. Staderini, R. 1896a.

Development. Includes *Gallus*. Staderini, R. 1896b.

MEDULLA OBLONGATA

General. Malacarne, V. 1782. *Anas*. Kreis, E. 1883.

Histology

General. Includes *Ciconia*. Höevell, J. J. 1911.

Reticular cells. Includes *Ciconia*. Höevell, J. J. 1911.

Nuclei and tracts

Cross section figures. *Anas*. Sanders, E. B. 1929; *Sinn, R. 1913. *Ardea*, *Athene*, & *Cygnus*. *Sinn, R. 1913. *Gallus*. Sanders, E. B. 1929; *Sinn, R. 1913. *Ibycter*. *Sinn, R. 1913. *Passer*. Sanders, E. B. 1929. *Plegadis*, *Plotus*, *Psittacus*, & *Rhea*. *Sinn, R. 1913.

Inferior olivary nucleus

General. Includes birds. Kooy, F. H. 1917. Many species. Gröbbels, F. 1923; Yoshimura, K. 1910.

Structure and significance. Includes *Columba*, *Fringilla*, *Grus*, & *Phoenix-copterus*. Williams, E. M. 1909.

CASTRATION,
EXPERIMENTAL

See also under **Reproduction and Sex**.

Book. Text in English. Punnett, R. C. 1923.

General. Anatidae. *Goodale, H. D. 1910b, 1912. *Fringilla coelebs*. Zawadowsky, M. M. 1926f. *Gallus*. Benoit, J. 1924c, d, 1926b, d; Cigna, G. F. 1788;

Finlay, G. F. 1925; Goodale, H. D. 1911a, 1913a, 1914; Goodale, H. D. & Nonidez, J. F. 1924; Morgan, T. H. 1917-18, 1919-20; Moussu, G. 1912; Pézard, A. 1913b; Watson, O. M. 1901. *Pyromelana franciscana*. Witschi, E. 1936.

Effects of ablation of testes and grafting ovaries into castrated males. Goodale, H. D. 1917b.

Histology of liver, spleen, kidney, and digestive tract of castrated birds on forced feeding. *Gallus*. Yosikawa, M. & Tomisima, R. 1932.

Latent period for change in secondary sex characters. *Gallus*. Pézard, A. 1921c.

Penetration of suprarenal glands by accidentally transplanted testis tissue. *Gallus*. Pézard, A. & Caridroit, F. 1922a.

Regeneration of testes in incomplete castration. *Gallus*. Benoit, J. 1926d.

Unilateral castration. Compensatory hypertrophy of remaining testis. Benoit, J. 1925; Domm, L. V. & Juhn, M. 1927.

EFFECTS OF CASTRATION

General. Goodale, H. D. 1915a; Larcher, O. E. 1917; Putzig, P. 1935. *Gallus*. Kammerer, P. 1912; Morgan, T. H. 1917a, 1917-18, 1919-20, 1920a, b; Pellegrini, G. 1927; Pézard, A. 1911c; Pézard, A., Sand, K., & Caridroit, F. 1923a, 1924d. *Meleagris*. Athias, M. 1928; van Oordt, G. J. & van der Maas, C. J. 1929. *Pyromelana franciscana*. Witschi, E. 1936. *Pyrrhula*. Hachlow, V. A. 1927; Zawadowsky, M. M. 1926f.

Crop secretion by male. Columbidae. Riddle, O. & Dykshorn, S. W. 1932.

Endocrine secretion. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1924h.

Liver. *Gallus*. Pézard, A. 1913a.

Metabolism. *Gallus*. Heymans, C. 1921; Szuman, J. G. 1926b.

Migration. Rowan, W. 1932.

Nervous energy. *Gallus*. Athanasiu, I. & Pézard, A. 1924.

Nutrition. Heymans, C. 1921.

Origin of germ cells. *Gallus*. Reagan, F. P. 1918.

Plumage. Pézard, A. 1928. *Columba*. Lipschütz, A. & Wilhelm, O. 1929. *Gal-*

lus. Morgan, T. H. 1917-18, 1919-20; Pézard, A. 1924b; Pézard, A., Sand, K., & Caridroit, F. 1923b, c, 1924d; Punnett, R. C. & Bailey, P. G. 1920.

Secondary sex characters. *Anas*. Poll, H. 1909. *Gallus*. Pézard, A. 1911a, b, 1920a, 1922b, 1924a, b, 1928; Poll, H. 1909. *Meleagris*. Athias, M. 1928. *Netta*. Poll, H. 1909.

Spurs, body size, gonads, plumage, thyroid gland, and behavior. *Meleagris*. van Oordt, G. J. & van der Maas, C. J. 1929.

Spurs, plumage, bursa Fabricii, etc. *Anas* & *Gallus*. Goodale, H. D. 1916c.

Thymus gland. Includes *Gallus*. *Soli, U. 1907, 1909. *Gallus*. Terni, T. 1927b.

Regression after castration

At puberty. *Gallus*. Pézard, A. 1920a.

Erectile tissue. Galli. Pézard, A. 1917.

Law of regression of secondary sex characters. Pézard, A. 1921b.

Regeneration of testes in incomplete castration. *Gallus*. Benoit, J. 1926c.

OVARIOTOMY

General. *Gallus*. Goodale, H. D. 1916b.

Effect of daily injections of hebin. Domm, L. V. 1933.

Effects of ovariectomy on

Development of comb and spurs. *Gallus*. Pézard, A. 1914, 1915.

Melanin pigment formation, in feeding thyroid gland. *Gallus*. Torrey, H. B. & Horning, B. 1925b.

Number of red blood corpuscles, increase in. Juhn, M. & Domm, L. V. 1930.

Sex transformation. *Gallus*. Benoit, J. 1924g.

CHROMAFFIN SYSTEM

General. Kose, W. 1902, 1904, 1907. Includes *Gallus*. Kull, H. 1925.

Chromaffin tissue in digestive system. Kull, H. 1925.

Paraganglia. Kose, W. 1904, 1907. *Columba* & *Gallus*. Ciaccio, C. 1906a, b.

CIRCULATORY SYSTEM

Publications dealing with the blood and lymph vascular systems in birds. See also **Heart**.

Books. Text in English. Hewson, W. 1768.

Text in French. Leboucq, H. 1876; Spallanzani, L. 1800-01.

Text in German. Gadow, H. 1891d; Tigerstedt, R. A. 1921-23.

General. Barkow, H. C. 1830a, b; His, W. 1902; Hochstetter, F. 1892; Jullien, J. 1878. Includes birds. Martin Saint-Ange, G. J. 1832.

Anas & *Columba*. Noka, H. 1931. *Gallus*. *Hahn, H. 1909; Noka, H. 1931. Include *Gallus*. Sabin, F. R. 1917a; Thomson, A. 1830. Megapodidae. Oustalet, J. F. 1880a. Spheniscidae. Filhol, H. 1885.

Development

Book. Text in English. Lillie, F. R. 1919.

General. Includes birds. Hochstetter, F. 1892. *Gallus*. His, W. 1902; Prevost, J. L. & Lebert, H. 1844, 1850. Include *Gallus*. Sabin, F. R. 1917a; Thomson, A. 1830.

Early development. Rabaud, E. 1896; Tur, J. 1929. *Gallus*. Budge, A. 1886; Dareste, C. 1866b; Disse, J. 1879.

ABNORMAL DEVELOPMENT

Atypical capillary involution. *Gallus*. Thoma, R. 1901a.

Double embryos. *Anas*. Ruth, E. S. 1916-18.

Omphalocele. *Gallus*. Rabaud, E. 1897.

BLOOD VESSELS

Books. Text in English. Owen, R. 1866-68.

Text in German. Many species. Gadow, H. F. 1891d.

General. Forbes, W. A. 1881g. Includes birds. Hasebroek, K. 1917. *Anas*. Nishimura, Y. 1927. *Aptenodytes patagonica*. Jullien, J. 1878.

Blood vessel plexuses. Many species. Ricchiardi, S. 1860, 1876.

Caudal blood vessels. Includes *Gallus*. Favaro, G. 1907.

Histology. *Anser* & *Columba*. Osolin, P. 1921. *Gallus*. Osolin, P. 1921; Siebrecht, A. H. 1925.

Sinusoids in various organs. *Gallus*. Minot, C. S. 1900a.

Valves. Includes birds. Pettigrew, J. B. 1864b.

BLOOD VESSELS OF VARIOUS ORGANS AND STRUCTURES

Arterio-venous anastomoses in toes. Many species. *Schumacher, S. 1915a.

Beak. *Rhamphastos*. Traill, T. S. 1815.

Bone. Includes *Anas* & *Tympanuchus*. Foote, J. S. 1921.

Bone marrow. Closed system. Doan, C. A. 1922a, b.

Brain. Craigie, E. H. 1929b.

Bursa Fabricii. Noka, H. 1929. *Anser*, *Columba*, & *Gallus*. Noka, H. 1931.

Crop. Many species. Kuriyama, T. 1931. *Columba*. Phisalix, C. A. 1890.

Esophagus. Many species. Kuriyama, T. 1931.

Eye. *Anas*, *Anser*, *Astur*, & *Scolopax*. Kijowska, W. 1926. *Numida*. Beauregard, H. 1878.

Head, including appendages. *Gallus*, *Lyrurus*, *Meleagris*, *Numida*, & *Phasianus*. *Wodzicki, K. 1929.

Pelvic region. *Gallus*. Toit, P. J. 1913.

Renal blood vessels. Falconiformes. Fitzpatrick, F. L. 1935.

Respiratory system. Musset, C. 1869.

Skin. *Anas*, *Ardea*, *Corvus*, *Numida*, *Strix*, & *Vultur*. Hyrtl, J. 1839.

Spinal cord. *Anas*, *Astur*, *Athene*, *Columba*, *Gallus*, *Numida*, & *Psittaci*. Sterzi, G. 1903, 1904a.

Suprarenal gland capsule. Includes birds. Srdinko, O. V. 1905.

Blood vessels of the limbs

General. Many species. Schröder van der Kolk, J. L. & Vrolik, W. 1848.

Plexuses in limbs. Many species. Schröder van der Kolk, J. L. & Vrolik, W. 1856.

DEVELOPMENT OF BLOOD VESSELS

Book. Text in German. Rückert, J. & Mollier, S. 1906.

General. Drummond, J. 1854. *Anas*. *Evans, H. M. 1909a, b. *Gallus*. Afanassieff, N. 1866; Balfour, F. M. 1873b; Coste, J. J. & Delpech, J. M. 1833; *Evans, H. M. 1909a, b; *Hahn, H. 1909; Miller, A. M. & McWhorter, J. E. 1914; Prévost, J. L. & Lebert, H. 1844, 1850; *Sabin, F. R. 1917b, 1920; Wissozky, N. 1877. Include *Gallus*. Jordan, H. E. 1917; Rückert, J. 1903.

Arterioles and venules. *Gallus*. Clark, E. R. 1915.

Development in isolated fragments of embryo. *Gallus*. Reagan, F. P. 1915b.

Vascular endothelium

Experimental study. *Gallus*. Reagan, F. P. 1917.

Origin. *Gallus*. Clark, E. R. 1914.

Development of blood vessels of various organs

Eye. *Anas*, *Anser*, *Astur*, & *Scolopax*. Kijowska, W. 1926.

Pulmonary blood vessels. *Gallus*. *Buell, C. E. 1922; Squier, T. L. 1916.

Spinal cord. Includes *Anas*, *Astur*, *Athene*, *Columba*, *Gallus*, *Numida*, & *Psittaci*. *Sterzi, G. 1903, 1904a.

Early development of blood vessels

General. *Anas*. Weber, A. 1907b, c. *Gallus*. Klein, E. 1871; Ruffini, A. 1913; Uskow, N. V. 1887. Includes *Struthio*. Mehnert, E. 1896b.

Blood islands. *Gallus*. His, W. 1902; Van der Stricht, O. 1893; Vialleton, L. 1892b.

Arteries

General. Barforth, A. H. 1786; *Barkow, H. C. 1829, 1830b, 1844; *Bauer, F. 1825. Many species. Meckel, J. F. 1826; *Ricchiardi, S. 1860, 1876. Includes birds. Poletti, L. 1833. Birds incidental. Mackay, J. Y. 1887a.

Anas. Barkow, H. C. 1829; *Hahn, L. G. 1830. *Anser* & *Ardea*. Barkow, H. C. 1829. *Bucorvus abyssinicus*. Ottley, W. 1879. *Ciconia*. Barkow, H. C. 1829. Includes *Columba*. Odera, R. 1928. *Corvus*. Barkow, H. C. 1829. *Eurylaemus*. Garrod, A. H. 1878d. *Falco* & *Fulica*. Barkow, H. C. 1829.

Gallus. Barkow, H. C. 1829; Hueber, J. E. 1837. *Oedinenemus* & *Podiceps*. Barkow, H. C. 1829. *Psarisomus*. Garrod, A. H. 1878d. *Tetrao*. Bonsdorff, E. J. 1859.

Branching locations. Includes birds. *Dragendorff, O. 1911.

Histology. *Aquila*. Argaud, R. 1904, 1908. Includes *Columba*. Odera, R. 1928.

Pulse rate. Many species. Löer, F. 1909e.

DEVELOPMENT

General. *Gallus*. Thoma, R. 1901b.

Arising from aortic arches. Includes *Gallus*. *Rathke, M. H. 1857.

VARIOUS ARTERIES

Abdominal arteries. Include birds. Manno, A. 1906a; Salvi, G. 1907.

Celiac and superior mesenteric arteries. *Eudypetes*. *Filhol, H. 1882b.

Intestinal arteries. Development. Includes *Gallus*. Möllendorff, W. 1911.

Neck arteries. *Bucorvus abyssinicus*. Ottley, W. 1879.

Pulmonary arteries. Development. Cannieu, A. 1897. *Gallus*. Tonge, M. 1868.

Spinal cord arteries. *Anas*, *Anser*, *Corvus*, *Gallus*, & *Turdus*. Hofman, M. 1900.

Splenic arteries. *Anas* & *Gallus*. Jolly, J. 1911f.

Tracheal artery. Daubenton, L. J. 1784. *Cygnus*. Book. Text in Italian. Redi, F. 1682. *Gruidae*. Duverney, J. G. 1733a.

Aorta

Abdominal aorta branches. Includes *Gallus*. Broman, I. 1907.

Accessory heart in caudal portion of aorta. *Cygnus*. Davy, J. 1849.

Development

General. Cannieu, A. 1897. *Gallus*. Prévost, J. L. & Lebert, H. 1850; Serres, A. E. 1851; Türistig, J. 1886; Vialleton, L. 1891, 1892a.

Aortic arches. *Gallus*. Locy, W. A. 1906.

Semilunar valves. *Gallus*. Tonge, M. 1868.

Carotid arteries

Book. Text in Latin. Nitzsch, C. L. 1839.

General. Garrod, A. H. 1873a; Hochstetter, F. 1912; Hyrtl, J. 1848; Mackay, J. Y. 1887b; *Meckel, J. F. 1826. Many species. *Meckel, J. F. 1829; Wagner, R. 1837.

Bucorvus. Garrod, A. G. 1876f. *Gallus*. Rathke, M. H. 1852. *Indicator*. Garrod, A. G. 1878c. *Pitta*. Bernstein, H. A. 1859a. *Plotus*. Garrod, A. G. 1878b. *Psittaci*. Nitzsch, C. L. 1859. Includes *Psittacus*. Rathke, M. H. 1850. *Rhea*. Evans, F. P. 1883.

Union of carotid arteries. Includes birds. Hochstetter, F. 1912.

Development

General. Mackay, J. Y. 1887b, 1889.

Ardea. Rathke, M. H. 1858. Includes *Corvus*. Rathke, M. H. 1859. *Gallus*. Rathke, M. H. 1858; *Twining, G. H. 1906. *Passer*. Rathke, M. H. 1858.

External carotid arteries. *Gallus* & *Struthio*. Fleming, R. E. 1926.

Head arteries

General. *Anas*. Rochas, F. 1885a. *Bucorvus abyssinicus*. Ottley, W. 1879.

Development. *Vanellus*. *Hafferl, A. 1921.

Brain arteries

Book. Text in English. Includes birds. Swedenborg, E. 1882.

General. *Beddard, F. E. 1905. Includes birds. De Vriese, B. 1905.

Anas & *Anser*. Hofman, M. 1900. *Anthropoides*, *Aquila*, *Ara*, *Asio*, *Cariama*, & *Cathartes*. *Beddard, F. E. 1905. *Corvus*. Hofman, M. 1900. *Dromaeus* [*Dromiceius*] & *Falco*. *Beddard, F. E. 1905. *Gallus*. Hofman, M. 1900. Includes *Gallus*. Coiter, V. 1573. *Goura*, *Gymnorhina*, *Pelecanus*, *Psophia*, *Spheniscus*, *Struthio*, *Syrnium*, & *Tantalus*. *Beddard, F. E. 1905. *Turdus*. Hofman, M. 1900.

Circulus arteriosus (Willis). *Columba* & *Gallus*. Longo, L. 1905.

Forebrain. Includes birds. Kappers, C. U. 1933.

Intercostal arteries

Origin in adult. *Spheniscidae*. Filhol, H. 1883c.

Structure and development. Many species. Pensa, A. 1905.

Limb arteries

General. Includes birds. Salvi, G. 1907.

Foot arteries. Includes birds. Manno, A. 1906b.

Leg arteries. *Aptenodytes* & *Eudypetes*. *Filhol, H. 1882a.

Peroneal arteries. Includes birds. Manno, A. 1906a.

Arteries of wings

General. *Aptenodytes* & *Eudypetes*. Filhol, H. 1882a. *Catarrhactes*. Müller, E. 1908a. *Pygoscelis*. Filhol, H. 1883b; *Müller, E. 1908a. *Spheniscus*. Filhol, H. 1883a.

Development. *Anas*. *Rabl, H. 1906, 1907a. *Catarrhactes* & *Pygoscelis*. Müller, E. 1908a. *Gallus*. *Rabl, H. 1907a. *Spheniscus*. Filhol, H. 1883a.

Structure. *Catarrhactes* & *Pygoscelis*. Müller, E. 1908a.

Subclavian arteries

General. Mackay, J. Y. 1889. Many species. Pitzorno, M. 1904.

Development. *Anas*. Rabl, H. 1905. *Gallus*. Bakst, H. J. & Chafee, H. F. 1928; Hochstetter, F. 1890; Locy, W. A. 1905; *Sabin, C. G. 1905.

Vertebral arteries

General. Includes birds. Krassnig, M. 1913b.

Development. *Gallus* & *Struthio*. Fleming, R. E. 1926.

Capillaries

Development and structure. Includes *Gallus*. Eberth, C. J. 1866-67.

Of the allantoic and vitelline membranes. *Gallus*. Dalrymple, J. 1844.

Rete mirabile

General. Müller, J. P. 1839a.

Arterial. *Barkow, H. C. 1844.

In skin. Freund, L. 1926c.

Venous. Many species. Neugebauer, L. A. 1845. Includes birds. *Hyrtil, J. 1863.

Veins

General. Many species. *Neugebauer, L. A. 1845. Birds incidental. Jacobson, L. L. 1821. Includes *Ciconia*, *Columba*, & *Gallus*. Nicolai, J. A. 1827. Includes *Falco* & *Gallus*. Nicolai, J. A. 1826. *Larus*. Rex, H. 1911.

Development. Includes birds. Rathke, M. H. 1838a. *Anas* & *Anser*. Nishimura, Y. 1927. *Gallus*. *Grafe, E. 1906; *Hochstetter, F. 1888a, 1894. Includes *Gallus*. Hochstetter, F. 1892.

Structure. Includes birds. Rathke, M. H. 1838a.

VARIOUS VEINS

Hepatic portal. Jacobson, L. L. 1817. *Gallus*. Choronschitzky, B. J. 1900.

Jugular. Reduction of left jugular vein. *Erethacus*, *Parus*, *Passer*, & *Turdus*. Wade, C. H. 1876.

Pulmonary. Development. *Anas*. Fedorow, V. 1908. *Gallus*. Chang, C. 1931b; Fedorow, V. 1908.

Limb. Development. Includes *Gallus*. Hochstetter, F. 1891.

Suprarenal. *Anas*, *Cariama*, *Gallus*, *Meleagris*, & *Rhynchotus*. Pettit, A. 1896.

Suprarenal capsule veins. Gratiolet, P. 1853.

Head veins

General. Birds incidental. Grosser, O. 1907.

Dural sinuses. Includes birds. Book. Text in English. Swedenborg, E. 1882.

Development

General. *Gallus*. *Stracker, O. 1916.

Veins of the cerebral meninges. Gelderen, C. 1924c. *Anas*. Gelderen, C. 1924a, 1926. *Gallus*. Gelderen, C. 1924a, b, 1926. *Vanellus*. Gelderen, C. 1924a.

Renal veins

General. Includes *Ciconia*, *Columba*, & *Gallus*. Nicolai, J. A. 1827. Includes *Falco* & *Gallus*. Nicolai, J. A. 1826.

Mesonephric veins. Grafe, E. 1904, 1906.

So-called renal portal veins

General. Gratiolet, P. 1853, 1856; Jacobson, L. L. 1817. Many species. *Jourdain, S. 1859; *Spanner, R. 1924. *Struthio*. Gratiolet, P. 1856.

Development. Includes *Anas* & *Gallus*. Book. Text in Dutch. Van Gelderen, C. 1925.

Experimental study of blood flow in kidney. *Anas*. *Das, B. K. 1931.

Mesonephric renal portal veins. Grafe, E. 1904.

Not true renal portal. *Das, B. K. 1924, 1931.

Venae cavae

General. Includes *Gallus*. Steno, D. N. 1673a.

Accessory vena cava. *Ara*. Thébault, V. 1900.

Superior vena cava. Valves. Homologies. *Dromaeus* [*Dromiceius*]. Coughtrey, M. 1873a.

Posterior vena cava. Development

General. *Gallus* & *Passer*. *Miller, A. M. 1903.

Mesentery. Includes *Gallus*. Hochstetter, F. 1888b.

LYMPHATIC SYSTEM

Books. Text in English. Hewson, W. 1771, 1846; Monro, A. 1791. Includes *Gallus*. Monro, A. 1770.

Text in German. Many species. Gadow, H. F. 1891d.

Text in Italian. Panizza, B. 1830.

Text in Latin. Includes birds. Lister, M. 1711. *Meleagris*. Lange, C. J. 1704.

General. Breschet, G. 1824; Held, H. 1904; *Lauth, E. A. 1822; Liebe, W. 1914; Magendie, F. 1819a, b, 1822. Include birds. Hewson, W. 1768; Huntington, G. S. 1911, 1914a, b.

Anas. Magendie, F. 1821; Manabe, S. 1930b. *Anser*. *Hewson, W. 1768; Magendie, F. 1821. *Columba*. Cuénot, L. 1889. *Cygnus*. Magendie, F. 1821. *Gallus*. *Baum, H. 1930. *Passer*. Cuénot, L. 1889.

Connections of lymphatics with veins. Includes birds. Book. Text in German. Fohmann, V. 1821.

Physiology. Lymph flow and pressure. *Gallus* embryo. *Clark, E. L. 1915.

Development

General. Clark, E. R. & Clark, E. L. 1912. Include birds. Huntington, G. S.

1911, 1914a, b. Birds incidental. McClure, C. F. 1915.

Anas. Mierzejewski, L. 1910. *Anser*. Mierzejewski, L. 1910; Pensa, A. 1907a. *Gallus*. Budge, A. 1882, 1887; *Clark, E. L. 1912a, 1915; *Clark, E. R. & Clark, E. L. 1920; Mierzejewski, L. 1910. Include *Gallus*. Sabin, F. R. 1916a, b. *Meleagris*. Mierzejewski, L. 1910.

Genetic relations of lymphatic and hemal vascular channels in embryo. Include birds. Huntington, G. S. 1914a, b.

Jugular lymph sac. *Gallus* embryo. Clark, E. L. 1912b; Miller, A. M. 1912.

Lymphatic plexus accompanying allantoic arteries. *Gallus*. Budge, A. 1881.

Perivascular lymphatics of the amnion & allantois. *Gallus* embryo. *Creighton, C. 1899.

Theory of celomic relationship. See Sabin, F. R. Anat. Rec. Vol. 2, pp. 46-47, 1908, and Keibel & Mall. Human embryology, Vol. 2, p. 730, 1912, for discussions of this theory. Budge, A. 1880.

Histology of the lymphatic vessels

General. *Anas*. Manabe, S. 1930a. *Anser*. Pensa, A. 1907a.

Lymphatics in the skin and mucosa. Includes *Gallus*. Held, H. 1904.

Lymphatic vessels of various organs and structures

Bursa Fabricii. *Columba*, *Gallus*, & *Uria*. Retterer, E. 1885b.

Crop. Location and direction of flow. *Gallus*. Kutsuna, M. & Kuriyama, T. 1932.

Ear. Birds incidental. Hasse, C. 1873a.

Eye. Birds incidental. Hamburger, C. 1914. Strigidae. Wagner, R. 1833a.

Lacteals of intestine. *Anser*. Basslinger, J. 1858b.

Skin. *Anas*, *Ardea*, *Corvus*, *Numida*, *Strix*, & *Vultur*. Hyrtl, J. 1839.

Stomach. *Gallus*. Peyer, J. C. 1677.

Tannenberg bodies in genitalia, which fill with lymph in erection. *Anas*. Müller, R. 1908.

Urogenital organs. *Anas*. Liebe, W. 1914.

Lymph hearts

Books. Text in German. Many species. Gadow, H. F. 1891d.

Text in Italian. *Anser*. Panizza, A. 1830.

General. Many species. *Stannius, F. H. 1843; Wodzicki, K. 1924.

Gallus. *Budge, A. 1882; *Clark, E. L. 1915; Clark, E. R. & Clark, E. L. 1912; Minot, C. S. 1883b; *Sala, L. 1899. Includes *Meleagris*. Tanasescu, J. G. 1908.

Development. *Gallus*. *West, R. 1914.

Early contractions. *Gallus* embryo. Clark, E. L. & Clark, E. R. 1914.

Thoracic duct

Development. *Gallus*. *Miller, A. M. 1913b; *Sala, L. 1899.

Hemophoric function. *Gallus*. Miller, A. M. 1913a.

CLOACA

Books. Text in German. Many species. Gadow, H. 1891d. *Gallus*. Spoo, A. R. 1883.

General. Budge, J. 1875; Fleischmann, A. 1902a, b; Harg, F. 1837.

Anas. Barkow, H. C. 1829; Eckhard, C. 1876; Keibel, F. 1921. *Anser*. Barkow, H. C. 1829; Eckhard, C. 1876. *Apteryx*. Gadow, H. F. 1887. *Ardea*. Barkow, H. C. 1829. *Casuarus*. Gadow, H. F. 1887 (title only); Mayer, A. F. 1842a. *Ciconia*. Barkow, H. C. 1829. *Columba*. Retterer, E. 1885a. *Corvus*. Barkow, H. C. 1829; *Retterer, E. 1885a. *Falco* & *Fulica*. Barkow, H. C. 1829. *Gallus*. Keibel, F. 1921. *Leptotilus*. Gadow, H. F. 1887. *Podiceps*. Barkow, H. C. 1829. *Rhea*. Gadow, H. F. 1887; Retterer, E. 1885a. *Sarcorhamphus gryphus*. Grant, R. E. 1833. *Struthio*. Gadow, H. F. 1887.

Structure. *Anas* & *Anser*. Pomayer, C. 1902. *Gallus*. Spoo, A. R. 1883.

Development

General. Fellner, L. 1875. *Anas* & *Anser*. Pomayer, C. 1902. *Gallus*. Cadiat, L. O. 1878c. Include *Gallus*. Holmdahl, D. E. 1925a; Spoo, A. R. 1883. *Struthio*. Boyden, E. A. 1922b. Includes *Sturnus*. Holmdahl, D. E. 1925a. *Vanellus*. *Hafferl, A. 1926.

Development of opening. *Gallus*. Gasser, E. 1879a, 1880.

Experimental study. Boyden, E. A. 1924.

Physiology

General. Action in absorbing water from urine. *Gallus*. Sharpe, N. C. 1912, 1923.

Blowing up the lining in sexual excitement. *Coracopsis vasa*. Sclater, P. L. 1884.

BURSA FABRICII

This is a dorsal diverticulum which persists variably in the adult. It was first described with figures by Fabricius ab Aquapendente in 1688.

Books. Text in German. Blumenbach, J. F. 1815. Many species. Gadow, H. F. 1891d.

Text in Latin. Fabricius ab Aquapendente, J. 1688. *Gallus*. Morgagni, J. B. 1723.

General. Barkow, H. C. 1829; Berthold, A. A. 1829a; Budge, J. 1875; Davy, J. 1867b; Disselhorst, R. 1897; *Forbes, W. A. 1877; Gallen, W. 1871; Geoffroy St. Hilaire, E. 1822b, d, e, 1823a, d; Huschke, A. 1838; Jolly, J. 1913c; *Osawa, G. 1911; Retterer, E. 1893a, b. Many species. Wenckelbach, K. F. 1889. Birds incidental. Retterer, E. 1906.

Anas. Barkow, H. C. 1829; Jolly, J. 1910b; Jolly, J. & Levin, S. 1911a; Keibel, F. 1921; Noka, H. 1931; Retterer, E. & Lelièvre, A. 1912; Spangenberg, G. 1813. *Bolaurus*. Barkow, H. C. 1829. *Cairina*. Jolly, J. 1910b. *Casuarus*. Lelièvre, A. & Retterer, E. 1910a; Perrault, C. 1733a. *Centropus*. Bernstein, H. A. 1860a. *Columba*. Barkow, H. C. 1829; Jolly, J. 1910b; Noka, H. 1931; Retterer, E. 1885a, b. *Corvus*. Retterer, E. 1885a. *Falco*. Barkow, H. C. 1829. *Fratercula*. *Retterer, E. 1885a. *Fringilla*. Spangenberg, G. 1813. *Gallus*. Barkow, H. C. 1829; Graaf, R. 1668; Jolly, J. 1910b; Keibel, F. 1921; Lelièvre, A. & Retterer, E. 1910a; Noka, H. 1931; *Retterer, E. 1885a, b; Spangenberg, G. 1813. *Larus*. *Retterer, E. 1885a. *Meleagris*. Retterer, E. & Lelièvre, A. 1912. *Rhea*. *Retterer, E. 1885a. *Struthio*. Perrault, C. 1733a; *Retterer, E. 1885a, b. *Struthioniformes*. Müller, J. P. 1836. *Uria*. *Retterer, E. 1885a, b.

Blood vessels. *Anas*, *Columba*, & *Gallus*. Noka, H. 1929, 1931.

Homologies. Mazza, F. 1898; Retterer, E. & Lelièvre, A. 1913a.

Modifications. *Casuarus* & *Gallus*. Lelièvre, A. & Retterer, E. 1910a.

Development

General. *Boyden, E. A. 1924; Mazza, F. 1898; Retterer, E. 1893a, b. Many species. *Wenckelbach, K. F. 1889.

Anas. Boyden, E. A. 1922a; Jolly, J. 1910b, 1911a; Keibel, F. 1921; Wenckelbach, K. F. 1889. *Anser*. Retterer, E. & Lelièvre, A. 1910a. *Buteo*. Schumacher, S. 1903. *Cairina*. Jolly, J. 1910b, 1911a. *Columba*. Jolly, J. 1910b, 1911a, e; Retterer, E. 1893a; Schumacher, S. 1903. *Columbidae*. Riddle, O. 1928b. *Cuculus*. Schumacher, S. 1903. *Gallus*. Boyden, E. A. 1922a; Jolly, J. 1910b, 1911a; Keibel, F. 1921; Retterer, E. 1893a; Retterer, E. & Lelièvre, A. 1910a; Schumacher, S. 1903; *Stieda, C. H. 1880; Uskov, N. V. 1883; Wenckelbach, K. F. 1889. *Larus*. Wenckelbach, K. F. 1889. *Monedula* & *Otus*. Schumacher, S. 1903. *Phasianus*. Boyden, E. A. 1922a. *Sterna*. Boyden, E. A. 1922a; Wenckelbach, K. F. 1889. *Uria*. Retterer, E. 1893a.

Relation to thymus gland in period of development and existence. Many species. *Jolly, J. 1915.

Histology

General. Hankó, B. 1909. Many species. *Alesi, V. 1875; Forbes, W. A. 1911; *Wenckelbach, K. F. 1889.

Alca. Retterer, E. & Lelièvre, A. 1913b. *Anas*. Wenckelbach, K. F. 1889. *Buteo*, *Columba*, & *Cuculus*. Schumacher, S. 1903. *Gallus*. Schumacher, S. 1903; *Stieda, C. H. 1880; Wenckelbach, K. F. 1889. *Larus*. Wenckelbach, K. F. 1889. *Monedula* & *Otus*. Schumacher, S. 1903. *Pandion* & *Phalacrocorax*. Retterer, E. & Lelièvre, A. 1913b. *Sterna*. Wenckelbach, K. F. 1889.

Histological modifications in young birds. *Columba*. Jolly, J. 1911e.

LYMPHOID TISSUE IN THE BURSA FABRICII

General. Jolly, J. 1911b, 1911g, 1913c. Many species. *Jolly, J. 1915. *Columba*.

Retterer, E. 1885b. *Cursores* & *Falconiformes*. Wenckelbach, K. F. 1896. *Gallus*. Jolly, J. 1911c; Retterer, E. 1885b. *Uria*. Retterer, E. 1885b.

Ameboid movements of small cells in lymphoid tissue. *Gallus*. Jolly, J. 1914a.

Lymph nodes. Histogenesis. Jolly, J. 1911a.

Involution

General. Masi, A. 1922. *Anas* & *Columba*. Jolly, J. 1911g; Jolly, J. & Levin, S. 1911a. *Columbidae*. Riddle, O. 1928b. *Gallus*. Jolly, J. 1911g; Jolly, J. & Levin, S. 1911a.

Relation of involution to sexual maturity. *Gallus*. Jolly, J. 1913a.

Physiology

General. Hankó, B. 1909.

Effects of extirpation of the bursa Fabricii. *Streptopelia*. Riddle, O. & Tange, M. 1928a.

X-ray effects on the bursa Fabricii. *Gallus*. *Unzeitig, H. 1912.

COLORATION

Most of the publications listed under this section involve feathers, or the plumage in general. For color perception, see under **Vision**: Color vision. See also **Feathers** and **Plumage**.

Books. Text in English. Beddard, F. E. 1892a; Chapman, F. M. 1912b; Keeler, C. A. 1893; Poulton, E. B. 1890; Wallace, A. R. 1878.

Text in German. Gadow, H. F. 1891d; Magnus, H. F. 1881; Schuster, W. 1906c. *Psittacidae*. Finsch, O. 1867-68. *Tropical birds*. Rensch, B. 1930.

General. Beddard, F. E. 1890f; Jeffries, J. A. 1883a; Kozlov, L. E. 1907; La Fresnaye, F. 1844; Lescuyer, J. F. 1883; Montessus, F. B. 1886; Schroeder, J. 1877; Schuster, W. 1903a.

Aestrelata aterrima. van Oort, E. D. 1911. *Corvus*. Finger, J. 1855. *Somateria*. Robinson, H. W. 1913b. *Somateria spectabilis*. Norton, A. H. 1900. *Spatula clypeata*. Hybrid. Arrigoni degli Oddi, E. 1910.

Adaptation in coloration. Braun, F. 1900d.

Genetic significance of coloration. Williams, J. B. 1899.

Pied varieties. *Coccothraustes*, *Columba palumbus*, & *Loxia*. Macpherson, H. A. 1895a. *Gallus*. Punnett, R. C. & Pease, M. S. 1927.

Recognition colors. McAtee, W. L. 1912a; Nichols, J. T. 1912. Books. Text in English. Dixon, C. 1897a; Poulton, E. B. 1890.

Variation in color. (See also under **Variation**.) *Alca*, *Corvus*, *Fratercula*, *Stercorarius*, *Syrhaptes*, & *Uria*. Shitkow, B. M. 1907.

Color keys

Color standards and color nomenclature—an elaborate and comprehensive work. Book. Text in English. *Ridgway, R. 1912.

Simple color standards useful in description. Book. Text in English. Chapman, F. M. 1912a.

Publications classified according to various structures or substances

Beak. Pelzeln, A. 1862. *Larus*. Dwight, J. 1920. Psittaci. Wagler, J. G. 1832.

Bile. Includes birds. Crisp, E. 1862c.

Body fat. Relation to food and pigments. *Gallus*. Palmer, L. S. & Kemper, H. L. 1919b.

Liver coloration. *Gallus*. Weber, E. H. 1850.

Palate and pharynx. Cleland, J. B. 1913a.

EGG COLOR

Book. Text in English. *Gallus*. Punnett, R. C. 1923.

General. Bencke, A. 1914; Clément, E. C. 1875; Giersberg, H. 1921; Gloger, C. W. 1829b; Hartert, E. J. 1890; Hunt, H. W. 1888; König-Warthaussen, R. 1860; Oberbeck, H. 1909; Osborne, S. D. 1879; Pässler, C. W. 1855; Raspail, X. 1892a; *Sorby, H. C. 1875, 1876; Szielsko, A. E. 1913. Many species. Nathusius, W. 1894a; Reichenau, W. 1877; Swynnerton, C. F. 1915a, 1916; Wickmann, H. 1893.

Cephus. Ussher, R. J. 1901a. *Cuculus*. Latter, O. H. 1902b. *Gallus*. Davy, J. 1864b; Matenaers, F. T. 1909; Schenkling-Prévôt, C. 1898a. *Rhea*.

Nathusius, W. 1896c. *Sphenisciformes*. Ussher, R. J. 1901a.

Age effects. Many species. Moquin-Tandon, C. H. 1859.

Causes of color in eggs. Cornay, J. E. 1860; Macpherson, A. H. 1889a; Müller, C. 1895b.

Climatic effects. Moquin-Tandon, C. H. 1859.

Development of color of eggs. Bau, A. 1908b; Kaiser, H. 1905; Macpherson, A. H. 1889a; Taschenberg, E. O. 1885, 1894; Wickmann, H. 1889.

Dichromatism in color of eggs. *Passer*. Patten, C. J. 1910a. *Turdus musicus*. Patten, C. J. 1909a.

Evolution of egg color. Book. Text in German. Reichenau, W. 1887.

Fading of egg color. Oberbeck, H. 1905.

Hybridization effect. *Gallus*. Tschermak, A. 1915. *Serinus*. Tschermak, A. 1910, 1912.

Indication of age of mother. *Lanius collurio*. Rey, J. G. 1908.

Melanism in eggs. *Anas*. Nordmann, A. 1862.

Mimicry in eggs. *Cuculus*. Cipriani, L. 1926; Lucanus, F. K. 1921b.

Nutritional effects. Many species. Moquin-Tandon, C. H. 1859.

Origin of egg color. Raspail, X. 1892a. *Corvus* & *Lanius*. Nathusius, W. 1894b.

Resemblance in color of eggs of cuckoo to eggs of host species. *Cuculus*. Rensch, B. 1924b; Schenk, J. 1904.

Significance of egg color. Many species. Pässler, C. W. 1860; Pycraft, W. P. 1908g.

Spiral arrangement of markings. Altmann, B. 1864.

Taxonomic bearing of egg color. *Cuculus canorus*. Rennie, John 1914.

Ultraviolet light used in viewing eggs. Schönwetter, M. 1932.

Variation in egg color. (See also under **Variation**.) *Cuculus*. Rey, J. G. 1899. *Lanius collurio*. Pässler, C. W. 1858.

Variegated eggs. *Gallus*. Landois, H. 1901.

Xenia effects of semen upon egg color. Gröbbels, F. 1934; Heinroth, O. 1913.

Pigments of shell

General. Kutter, B. F. 1877; Müller, C. 1895b; *Sorby, H. C. 1875, 1876; Tschermak, A. 1915; Anon. 1876a, 1879. Many species. Krukenberg, C. F. 1883b; Nathusius, W. 1882b, 1894a. *Corvus*. Nathusius, W. 1894b. *Eurylaemus* & *Gallus*. Wurm, W. 1892. *Lanius*. Nathusius, W. 1894b.

Chemical composition. *Corvus*, *Sylvia*, & *Turdus*. Wicke, W. 1858.

Development of pigment of egg shell and its decay. M'Alldowie, A. M. 1886.

Ooporphyrin. *Fischer, H. & Kogl, F. 1923.

Overlying shell structure effects on color of deeply placed pigments. *Fratercula*. Bunyard, P. F. 1922.

Pigment formation in oviduct. Giersberg, H. 1923.

Spectra of egg shell pigments. Liebermann, C. 1878.

Relation of egg color to color of

Host's eggs. *Cuculus*. Schenk, J. 1904; Smith, A. C. 1868a, b, 1873a, b.

Plumage. Many species. Moquin-Tandon, C. H. 1859.

Young birds in down plumage. De-loche, —. 1853.

Yolk color

General. Crepin, P. 1925.

Cause of olive-colored egg yolks. *Gallus*. Payne, L. F. 1925.

Coloring matter of egg yolk. Literature review. *Gallus*. Mattikow, M. 1932.

Relation in color of yolk to food-pigments. *Gallus*. Palmer, L. S. & Kempster, H. L. 1919a.

Feeding effects

General. *Gallus*. Henderson, E. W. & Wilcke, H. L. 1933.

Experimental feeding. *Gallus*. Clayton, M. G. 1925.

Variation

General. Parker, S. L., Gossman, S. S., & Lippincott, W. A. 1926.

Seasonal variations. *Gallus*. Parker, S. L. 1927.

EYE COLOR

See also under Eye: Iris.

General. Corbin, G. B. 1906. *Aestrelata aterrima*. van Oort, E. D. 1911. *Anhinga*. Wetmore, A. 1920a. *Coccythraustes*. Robinson, H. W. 1925. *Fuligula nyroca*. Bird, M. C. 1906; Smalley, F. W. 1906. *Larus ridibundus*. Robinson, H. W. 1925. *Nyroca f. ferina*. Dalglish, G. 1906; Robinson, H. W. 1925. *Pavo*. Finn, F. 1928.

Iris color

Book. Text in English. Wilson, A. & Bonaparte, C. L. 1831.

General. Bruhin, T. A. 1870. Falcones. Pelzel, A. 1862. Young birds. Biedermann, R. 1897b.

Causes of color of the iris. Bond, C. J. 1920a.

PLUMAGE COLOR

General. *Fatio, V. 1866. Many species. Rensch, B. 1923c.

Classification. Görnitz, K. 1923b.

Down feathers of adult. Anatidae. Bowles, J. H. 1917a; Hartert, E. J. 1917a; Witherby, H. F. 1917a.

Hyperchromism and geographic variation. Ridgway, R. 1872.

Tropical heat and light do not produce brilliant colors. Wallace, A. R. 1861.

Ventral coloration with wings spread. Falcones & Strigidae. Seton, E. T. 1897.

Plumage of young birds

Book. Text in English. Wilson, A. & Bonaparte, C. L. 1831.

General. Biedermann, R. 1897b.

Nestling birds. Pycraft, W. P. 1904a. European birds. Vian, J. 1886. Passerine birds. Saunders, A. A. 1920. *Aegialitis*. Lowe, P. R. 1914. *Anas*. Jackson, A. C. 1918a. *Charadrius*. Lowe, P. R. 1914. *Eclectus*. Meyer, A. B. 1882b. *Nyroca*. Jackson, A. C. 1918a. *Pavo nigripennis*. Selater, P. L. 1897a. Ploceidae. Chapin, J. P. 1917.

SKIN COLOR

General. *Gallus*. Barrows, H. R. 1914. *Sturnus*. Harrison, J. M. 1928.

Seasonal change in color of skin. *Nycticorax n. hoaceli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938.

Skin color in naked areas

Gular sac. *Anhinga*. Wetmore, A. 1920a.

Neck. *Casuarus*. Mathews, G. M. 1912.

Soft parts. Bangs, O. & Van Tyne, J. 1931; Dearborn, N. 1907; Garnett, M. 1919. *Acridotheres*. Inglis, C. M. 1900. *Anhinga*. Wetmore, A. 1920a. *Podiceps*. Bedford, M. 1910.

Feet

Larus. Dwight, J. 1920. *Larus minutus*. Macpherson, H. A. 1899b.

Green and yellow colors. *Gallus*. Knox, C. W. 1931.

Head

General. *Casuarus*. Mathews, G. M. 1912.

Mouth parts. Nestling birds. Dunlop, E. B. 1911c; Jackson, A. C. 1908; Leigh, A. G. 1909; Pycraft, W. P. 1907c; Ticehurst, C. B. & Leigh, A. G. 1909. Many species. *Swynnerton, C. F. 1915a, 1916; Ticehurst, C. B. 1908a. *Ampelis*. Pycraft, W. P. 1909a. *Erythrura psittacea*. Sarasin, C. F. 1913b. *Ortygospiza polyzona*. St. Quintin, W. H. 1910. Ploceidae. Chapin, J. P. 1917. *Poephila mirabilis*. Butler, A. G. 1898b, 1916-17.

ABNORMAL COLORATION

General. Arrigoni degli Oddi, E. 1894a; Carlotto, G. A. 1914; Cipolla, F. 1896; Coopman, L. 1925; Floericke, C. 1890b; Frauenfeld, G. 1853b, 1873b; Ingram, C. 1908d; Lawrence, G. N. 1889; Leone, N. 1909; Leverkus, P. 1887; Miller, G. S. 1897; Schaeck, F. 1892; Smith, C. 1875; Swaen, A. E. 1913; Tschusi zu Schmidhoffen, V. 1866b, 1867, 1908c; Weigold, H. 1923; Wenig, J. 1930. Many species. Gengler, J. 1906a; Ninni, E. 1903b; Paris, P. 1909; Petit, L. 1909; Pistone, A. 1891; Robbecke, E. 1894; Tschusi zu Schmidhoffen, V. 1886b. Includes birds. Kempen, C. 1888, 1894, 1897, 1899.

85 specimens in Italian collections. Cecilia, P. 1903.

Miscellaneous anomalies in a collection of birds. Anfrie, E. 1917.

Anas. Angelini, G. 1899; Baer, W. 1897a; Anon. 1896b. *Anas boschas*.

Ninni, E. 1903a; Schiavuzzi, B. 1884. Anatidae. Blaauw, F. E. 1907a; Leverkus, P. 1892. *Branta c. canadensis*. Kennard, F. H. 1912. *Caccebis*. Pycraft, W. P. 1908f. *Carduelis*. Blake-Knox, H. 1870c; Stresemann, E. 1924c. *Colinus*. Oberholser, H. C. 1898. *Columba palumbus*. Smith, J. A. 1858a. Corvidae. Washington, S. 1888. *Corvus*. Bodnar, B. 1917; McCook, P. J. 1897. *Corvus cornix*. Möschler, A. B. 1899. *Corvus corone*. Tschusi zu Schmidhoffen, V. 1902. *Corvus frugilegus*. Chlebovsky, —. 1909. *Dafila acuta*. Ninni, E. 1902c. *Emberiza*. Angelini, G. 1911; Gengler, J. 1904b; Grote, H. 1908. *Emberiza c. citrinella*. Natorp, O. 1903. *Falco*. Parrot, C. P. 1901. *Fringilla*. Braun, F. 1901. *Gallus*. Godbey, C. B. & Reid, D. H. 1931. *Gecinurus viridis*. Horsbrugh, C. B. 1899. *Habia ludoviciana*. Porter, L. H. 1892. *Hedymeles ludovicianus*. Dearborn, N. 1907. *Ixoreus*. Law, J. E. 1931. *Lagopus*. Carpelan, J. 1928. *Lanius*. Gengler, J. 1907. *Linota cannabina*. Blaauw, F. E. 1907a. *Marila*. Henninger, W. F. 1909a. *Merula*. Gengler, J. 1904a. *Munia flaviprymna*. Seth-Smith, D. 1907a. *Parus major*. Poli, A. 1905. Includes *Passer*. Bandermann, F. 1915. *Pinicola enucleator*. Howe, R. H. 1896. *Saxicola melanoleuca*. Kollibay, P. R. 1905. *Sialia sialis*. Ridgway, R. 1886. *Sitta homoyeri*. Lönnberg, A. J. 1929d. *Strix flammea*. Leone, N. 1907. *Sula*. Atkinson, J. 1910. *Sula [Moris] bassana*. Gadeau de Kerville, H. 1903a. *Tetrao*. Boase, H. 1918. *Tetrastes b. bonasia*. Schäff, E. A. 1889a. *Turdus merula*. Koepert, O. 1895; Krauss, J. 1884. *Turdus m. migratorius*. Barrows, W. B. 1884, 1885a, b. *Turdus pilaris*. Lönnberg, A. J. 1929c.

Asymmetrical color of eyes. Gadeau de Kerville, H. 1888.

Beak colored abnormally. *Paradoxornis*. Rickett, C. B. 1904.

Disease or injury as cause of abnormal pigmentation. Heinroth, O. 1903a.

Failure of nestling down feathers to break off as cause of abnormal color. *Podiceps n. nigricollis*. Witherby, H. F. 1915b.

Rufous variety. *Perdix montana*. Masefield, J. R. 1902.

Adventitious coloration

Flesh of birds stained by poke berries. Van Ostrand, H. T. 1896.

PLUMAGE DISCOLORATION

General. McGregor, R. C. 1900b; Pelzeln, A. 1886b.

Brown stain. Anatidae. Bales, B. R. 1909.

Ferruginous stain. Kennard, F. H. 1918. *Cygnus*. Stevenson, H. 1876. *Gypaëtus*. Dodsworth, P. T. 1912b. *Megalornis g. grus*. Homeyer, E. F. 1864b.

Orange or yellow color. Indians of Brazil said to pluck certain feathers and then to inject a milky fluid made from skin of a frog. Harting, J. E. 1879a.

Yellow color due to spores of slime mold. *Baeolophus*. Grinnell, J. 1921b.

Red color

General. *Anas*. Tyzenhauz, C. 1847.

Breast. *Querquedula*. Boyes, F. 1876a.

From feeding among weeds. *Cygnus*. Frere, H. T. 1846a.

WHITE COLOR OF FEET DUE TO

Excrement. *Ciconia*. Warren, E. 1929.

Mud on feet. *Ciconia*. Warren, E. 1929.

Albinism

Publications dealing with partial or complete albinism, a condition due to the absence of melanin pigment.

Books. Text in English. Stoddard, H. L. 1931.

Text in German. Bruch, C. W. 1844; Radde, G. F. 1884.

General. Altum, B. 1865b; Aplin, O. V. 1892a; Arrigoni degli Oddi, E. 1906a; Averin, V. G. 1912a; Böckmann, F. 1880; Buchner, O. 1919; Buller, W. L. 1895b; Burg, G. 1906; Butler, A. G. 1904; Butler, A. W. 1888; Cannavillo, E. 1892; Carlotto, G. A. 1914; Caterini, F. 1928; Ceglie, F. 1897; Chaine, J. 1925; Chapel, F. 1906, 1909a; Cipolla, F. 1896; Cnoeffelius, A. 1676; Cole, L. J. 1897; Coopman, L. 1925; Cornalia, E. 1867; Coues, E. B. 1869a; D., R. 1889; Daniel, L. 1900; Deane, R. 1876, 1879; Dickey, D. R. & van Rossem, A. J. 1923; Doebner, E. P. 1865b; Dury, C. 1888; Emerson, W. O. 1888; Fabani, C. 1892a, c; Finger, J. 1853; Fischer-Sigwart, H. 1892; Floericke, C. E.

1890b; Forrest, H. E. 1903; Frauenfeld, G. 1853b, 1866a; Gäde, G. 1859; Giachetti, —. 1889; Giebel, C. G. 1866a; Gill, H. 1909; Gloeden, B. 1877; Gredler, V. M. 1883; Gressner, H. 1886; Hargitt, C. W. 1889; Hermann, R. 1906; Hessler, A. 1854a; Heyne, O. 1907; Jäger, C. 1864; Johansen, H. 1909b; Kempen, C. 1901a; Kirk, T. W. 1879; König-Warthaussen, R. 1854; Kunstler, J. & Chaine, J. 1906; Lachmund, F. 1876a; Leverkus, P. 1887, 1889b; Lühe, M. 1909a; Macpherson, H. A. 1883g; Mäklin, F. W. 1870; Maestri, A. 1871; Martin, L. 1876; Mayhoff, H. 1915; Mazo y Franza, J. 1899; Mazza, F. 1890; Neunzig, R. 1927b; Ninni, E. 1900; Otto, B. C. 1778; Page, H. W. 1878; Picchi, C. 1903; Potier de la Varde, R. 1905; Puhlmann, E. 1916; Rensch, B. 1925a; Rothschild, L. W. 1913b; Sauvage, H. E. 1906; Schaeck, F. 1892; Schifferli, A. 1920a; Schroeck, L. 1677; Schuster, W. 1902b; Skovgaard, P. 1923c; Soler y Pujol, L. 1905; Solomirsky, D. P. 1913; Toppan, G. L. 1887; Townsend, C. H. 1883a; Tschusi zu Schmidhoffen, V. 1866a, b; Van Ostrand, H. T. 1897; Walch, J. E. 1774; Williams, R. P. 1849–55; Witherby, H. F. 1913d; Wood, C. A. 1924a; Anon. 1873c, 1883b.

Many species. Boubier, M. 1927; Caterini, F. 1928; Götz, G. F. 1781; Gundlach, J. C. 1891; Hall, R. 1900b; McGregor, R. C. 1896, 1900b; Minà-Palumbo, F. & Morici-Minà, M. 1898; Pelzeln, A. 1865; Petit, L. 1909; Philippi, R. A. 1892; Robbecke, E. 1894; Rollinat, R. 1890; Rothschild, L. W. 1913a; Rzehak, E. C. 1896c; Seabra, A. F. 1926; Smith, C. 1875; Stölker, C. 1877a; Thienemann, G. 1852; Willemoes-Suhm, R. 1865a; Worthen, C. K. 1896.

Include birds. Dei, A. 1895a; Fischer, J. 1874; Kempen, C. 1888, 1894, 1897, 1901a; Macpherson, A. H. 1892; Rey, J. G. 1870; Weir, J. J. 1892; Zollikofer, E. H. 1893a.

Acanthis c. cannabina. Nicholls, H. 1875. *Accipiter*. Bangs, O. 1915. *Agelaius*. Emerson, W. O. 1902; Hoffman, W. J. 1878; Jewett, M. 1910; Littlejohn, C. 1901; Robinson, W. 1888; White, G. S. 1896. *Agriocharis ocellata*. Shufeldt, P. W. 1913. *Alauda*. Masch, —. 1779; Ternier, L. 1911; Vallon, G. 1912. *Alauda arvensis*. Arrigoni degli Oddi, E. 1889d; Lindner, F. 1889; Smith, J. A. 1867a; Whitaker, J. 1872.

- Ampelis*. Robinson, W. 1888. *Anas*. Györfy, I. 1929; McCallum, G. A. 1885; Olofsson, G. 1929; Stölker, C. 1870a. *Anas boschas*. Rogeron, G. 1898, 1903. *Anas c. crecca*. Johansen, H. 1909a. Anatidae. Arrigoni degli Oddi, E. 1898b; Brooks, A. 1920; Bryant, H. C. 1914a; Honywill, A. W. 1910; Ternier, L. 1909. *Anser*. Gladstone, H. S. 1926. *Anser albifrons* & *A. hyperboreus*. Schenk, J. 1925-26. *Anthus pratensis*. Schiavuzzi, B. 1883. *Anthus spinoletta*. Tschusi zu Schmidhoffen, V. 1892a. *Anthus trivialis*. D., R. 1889. *Aptenodytes*. Rothschild, L. W. 1905. *Apteryx*. Hamilton, H. 1922. *Aquila*. Thompson, C. S. 1898. *Aquila chrysaetos* & *Archibuteo lagopus*. Arrigoni degli Oddi, E. 1889d. *Archilochus*. Oberholser, H. C. 1919a. *Ardea*. Inglis, C. M. 1903. *Ardea herodias*. Howard, O. W. 1899. *Asio accipitrinus*. Sage, J. H. 1883. *Asio f. flammeus*. Tschusi zu Schmidhoffen, V. 1897. *Asio otus*. Gengler, J. 1906a. *Astur*. Stucke, O. 1894. *Athene*. Annandale, N. 1910; Blaauw, F. E. 1905a; Giglioli, E. H. 1903. *Bernicla*. Townsend, C. H. 1883c. *Bonasa*. Van Ostrand, H. T. 1897. *Branta b. bernicla*. Leege, O. 1909. *Budytes flavus*. Reichling, H. 1920. *Buteo*. Emerson, W. O. 1893; Higgins, H. C. 1893; Hoffman, W. J. 1878; Stucke, O. 1894; Townsend, C. H. 1883c; Villatte des Prugnes, R. 1912. *Buteo borealis*. Kumbien, L. 1895. *Buteo b. buteo*. Gengler, J. 1906a; Tschusi zu Schmidhoffen, V. 1892b. *Calamodus*. Rohweder, J. 1901-02. *Calamospiza*. Hoffman, W. J. 1878. *Callipepla*. Smith, A. P. 1908a. *Calypte*. Allen, C. A. 1878. *Cannabina*. Fischer, J. 1873. *Caprimulgus europaeus*. Langton, H. 1885. *Carduelis*. Arrigoni degli Oddi, E. 1889d; Blake-Knox, H. 1870c; Stresemann, E. 1924c. *Carduelis c. carduelis*. Poliakov, G. I. 1917. *Carduelis elegans*. Arrigoni degli Oddi, E. 1889d. *Carpodacus*. Bergtold, W. H. 1914; Swarth, H. S. 1899. *Catarrhactes*. Rothschild, L. W. 1905. *Cathartes*. Gudger, E. W. 1918; Oberholser, H. C. 1918; Redington, A. P. 1897; Reid, C. S. 1897; Robinson, W. 1888, 1889. *Cathartes aura*. Nauman, C. H. 1870; Nicholson, A. M. 1897. *Chelidon*. Wenig, J. 1930. *Chelidon urbica*. Gengler, J. 1906a. *Chloris*. Compton, W. W. 1911. *Chondestes*. Sherrill, W. E. 1898. *Circus aeruginosus*. Ninni, E. 1902a; Schlüter, W. 1910. *Coccothraustes*. Daut, K. 1911d; Macpherson, H. A. 1895a. *Colinus*. Robinson, W. 1888; Sprunt, A. 1928; Van Ostrand, H. T. 1897; Wayne, A. T. 1902. *Columba*. Allen, G. M. 1914; Townsend, C. W. 1915; Whitaker, J. I. 1890. *Columba p. palumbus*. Macpherson, H. A. 1895a. Columbidae. Snell, F. H. 1857a. *Colymbus*. Chernel von Chernelhaza, I. 1905; Gloger, C. W. 1866. *Corvus*. Aplin, O. V. 1911; Bézier, T. 1902; Blatter, E. 1906; Bodnar, B. 1917; Daut, K. 1911c; Ellison, A. 1887; Gredler, V. M. 1873; Hartert, E. J. 1901; Hoffman, W. J. 1878; Krüdener, A. 1886; Lyall, W. 1878; Masch, —. 1779; Michel, J. 1889; Mikolás, K. 1929b; Otto, H. 1910a; Paullin, C. F. 1688a; Robinson, W. 1888; Simpson, R. B. 1895; Strong, R. M. 1897; Stuhr, F. A. 1896; Waite, E. R. 1892a; Wenig, J. 1930; Witzel, J. L. 1673. *Corvus b. brachyrhynchus*. Stoner, D. 1935a. *Corvus corax*. Kleinschmidt, O. & Hartert, E. J. 1901. *Corvus c. cornix*. Hagen, W. 1915; Mühlen, W. 1910; Ržehak, E. C. 1894a; Schulz, F. 1896. *Corvus corone*. Koch, R. 1893; Krauss, J. 1884; Wilson, W. 1909. *Corvus frugilegus*. Tegetmeier, W. B. 1895. *Corvus m. monedula*. Finger, J. 1855; Larkin, E. P. 1892; Pavlov, S. T. 1909b; Petit, L. 1894; Pogorzeliskij, V. A. 1909; Serle, W. 1899. *Corvus splendens*. Logan, A. C. & Blatter, E. 1906. *Coturnix*. Sachse, C. 1889. *Crex*. Loudon, H. 1907. *Cuculus*. Gredler, V. M. 1873. *Cyanistes*. Parona, C. 1879. *Cyanocitta*. Dean, R. H. 1898. *Cygnus*. Forel, F. A. 1869; Maillefer, A. 1921.
- Delichon u. urbica*. Monastero, S. 1930; Sachse, C. 1889. *Dendrocopus*. Hagen, W. 1915. *Dendrocoryna*. Dickey, D. R. & van Rossem, A. J. 1923. *Dendroica*. Townsend, C. H. 1883c. *Dendroica striata*. Reed, J. H. 1888. *Dolichonyx*. Gray, A. F. 1879. *Dolichonyx oryzivorus*. Strecker, H. 1869. *Dromolaia leucurus*. Arrigoni degli Oddi, E. 1889d. *Dryobates*. Daut, K. 1911b; Wyman, L. E. 1923. *Dupetor flavicollis nesophilus*. Stresemann, E. 1926a. *Emberiza*. Chernel von Chernelhaza, I. 1909b; Cullingford, J. 1883; Hachlow, W. A. 1915; Harris, M. 1912; Mikolás, K. 1929b; Vallon, G. 1912. *Emberiza miliaria*. Smith, J. A. 1852. *Ereunetes*. Murphy, R. C. 1912. *Erithacus*. Campbell, C. W. 1898; Vallon, G. 1912. *Erithacus rubecula*. Arrigoni degli Oddi, E. 1889d; Hale, J. R. 1911. *Erythropgia*. Horsbrugh, C. B. 1906a. *Eudypula*. Rothschild, L. W. 1905.

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- 1877; Mikolás, K. 1929b; Montlezun, A. 1904a; O'Gara, P. J. 1915; Otto, B. 1905; Robinson, W. 1888; Savatier, A. 1882; Schmitz, E. 1913; Schreitmüller, W. 1925; Senonner, A. 1889a; Smith, J. A. 1867d; Strong, W. A. 1916; Stucke, O. 1894; Swarth, H. S. 1915a; Tiemann, F. 1868; Tomásek, K. 1891; Washburn, F. L. 1915; Weyland, P. 1905. *Passer italiae*. Franzoi, E. 1897. *Passer montanus*. Arrigoni degli Oddi, E. 1889d; Lauer, H. 1908a. *Passerculus*. Murray, J. J. 1929. *Passerella*. Jewett, M. 1910. *Passeres*. Bonalda, C. 1889; Cantwell, G. G. 1888. *Passerherbulus* [Ammospiza]. Wayne, A. T. 1921-22; Whittle, C. L. 1923. *Passeriformes*. Longo, A. 1888. *Perdix*. Anne, M. 1906; Haase, O. 1902; Labler, —. 1884; Otto, H. 1910a; Savatier, A. 1882; Wenig, J. 1930. *Perdix cinerea*. Innes, J. B. 1884; Meyer, A. B. 1891a; Nostiz, L. 1884. *Perdix grisea*. Bézier, T. 1906. *Petrochelidon*. White, G. R. 1898. *Phalacrocorax*. Bonomi, P. 1897; Frohawk, F. W. 1910a; Sim, G. 1884; Sinclair, R. 1903. *Phasianidae*. Dureau de la Malle, A. J. 1856. *Phasianus*. Anne, M. 1906; Blasius, R. 1897; Hornung, V. 1902; Mikolás, K. 1929b; Wenig, J. 1930. *Philohela*. Van Ostrand, H. T. 1897. *Phyllopyneuste trochilus*. Liebe, K. T. 1886. *Pica*. Anfric, E. 1890; Bézier, T. 1906; Ellison, A. 1887; Rockwell, R. B. 1910; Townsend, C. H. 1883c; Waite, E. R. 1892a. *Pica rustica*. Lepri, G. 1892; Macpherson, H. A. 1883h. *Picus*. Daut, K. 1911b; Gadeau de Kerville, H. 1901; Savatier, A. 1882. *Pipilo*. Anthony, A. W. 1894; Hurd, T. D. 1888; Redington, A. P. 1897; Townsend, C. H. 1883c. *Pipilo fuscus*. Hudson, L. W. 1920. *Platycercus auriceps*. Kingsley, R. I. 1891; Kirk, T. W. 1886. *Plectrophanes*. Fischer, J. 1873. *Pluvialis a. apricaria*. Talbot-Ponsonby, F. G. 1913. *Podiceps*. Grochmalicki, J. 1925. *Poocetes gramineus*. Williams, R. W. 1902. *Porzana*. Robinson, W. 1888. *Prunella m. modularis*. Whitaker, J. 1872. *Psittaci*. North, A. J. 1904. *Puffinus*. Schmitz, E. 1909. *Pygoscelis*. Clarke, W. E. 1905a; Rothschild, L. W. 1905. *Pygoscelis adeliae*. Wilson, E. A. 1905. *Pyrgita*. Schmitz, E. 1909. *Pyrrhula*. Philippi, R. A. 1892; Whitaker, J. 1872. *Pyrrhulopsis splendens*. Wood, C. A. 1924a.
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degli Oddi, E. 1889d; Gengler, J. 1906a; Maneval, H. 1924. *Turdus viscivorus*. Ritter, A. 1888. *Turtur*. Boni, A. 1902. *Turtur tigrinus*. Hopwood, J. C. 1906. *Tyrannus*. Townsend, C. H. 1883c. *Upupa*. Brooke, A. T. 1912; Kollibay, P. R. 1917; Montlezun, A. 1904a, b; Pelzeln, A. 1886b. *Upupa epops*. Arrigoni degli Oddi, E. 1889d; Hugues, A. 1925. *Uria*. Morley, J. 1898. *Uroaetus*. White, H. L. 1916. *Vanellus*. Baudouin, M. 1907, 1908; Buckley, T. E. 1900a; Gilbert, R. H. 1862; Jackson, A. C. 1913b. *Vanellus cristatus*. Arrigoni degli Oddi, E. 1889d. *Vulpanser tadorna*. Arrigoni degli Oddi, E. 1889d. *Zonotrichia*. Keyes, C. R. 1910; Redington, A. P. 1897; Swarth, H. S. 1899. Hybrid of *Dafila acuta* × *Anas boschas*. Lécaillon, A. 1923.

Color of iris in albino birds. Aplin, O. V. 1891; Corbin, G. B. 1891; Hugues, A. 1907a; Ingram, W. J. 1892; Weir, J. J. 1891. *Passer*, *Psittaci*, & *Turdus*. Verrall, J. H. 1892.

Egg albinism. *Sturnella*. Williams, R. W. 1896a.

CAUSES OF ALBINISM

General. Fabani, C. 1892a; Neunzig, R. 1927b.

Acquired albinism. Crew, F. A. 1922a.

Biology of albinism. Charlemagne, E. V. 1914.

Entirely white plumage developing after bird was severely wounded. *Gallus*. Heron, R. 1835.

Pain believed by an uncritical author to be cause of albinism. *Gallus*. Anon. 1890b.

Asymmetry

Eyes. Gadeau de Kerville, H. 1888.

One side yellow and other side white. *Gallus*. Lambert, W. V. 1929.

Egg color anomalies

General. Nibe, T. 1922; Raspail, X. 1892b; Schmidt, R. 1920. Many species. Moquin-Tandon, C. H. 1859. *Fulica*. Wetmore, A. 1917a.

Albinism in eggs. *Sturnella*. Williams, R. W. 1896a.

Black eggs laid by white duck. Mack, —. 1851.

Erythrism. Baker, E. C. 1918; Jourdain, F. C. & Borrer, C. 1914. *Lanius collurio*. Rey, J. G. 1908. *Sylvia atricapilla*. Zimmermann, —. 1907.

Isabellism

This term has been applied by various authors to abnormal colorations of the plumage having a faded appearance and presumably deficient, but not entirely lacking, in melanin pigmentation.

General. Caterini, F. 1928; Fabani, C. 1892d; Kempen, C. 1888, 1894; Mazza, F. 1890; Schaeck, F. 1892. Many species. Minà-Palumbo, F. & Morici-Minà, M. 1898; Rollinat, R. 1890.

Alauda cristata. Spreitzenhofer, G. C. 1858. *Anas boscas*. Hänish, R. 1902; Ninni, E. 1908a. *Corvus frugilegus*. Chlebovsky, —. 1909. *Fringilla carduelis*. Hessler, A. 1854a. *Motacilla*. Fabani, C. 1892c. *Passer*. Hessler, A. 1854a. *Passeres*. Bonaldi, C. 1889. *Phalacrocorax*. Bonomi, P. 1897. *Pica rustica*. Lepri, G. 1892. *Scolopax rusticola*. Lepri, G. 1892; Newman, E. 1855b.

Inferred isabellism. *Corvus*. McCook, P. J. 1897. *Corvus cornix*. Möschler, A. B. 1899. *Corvus splendens*. Logan, A. C. & Blatter, E. 1906.

Lipochrome pigment anomalies

General. Rensch, B. 1925c.

Absence of lipochrome pigment. Duncker, H. 1927b.

Asymmetrical coloration. One side yellow and other side white. *Gallus*. Lambert, W. V. 1929.

Flavism. *Phylloscopus t. trochilus*. Tratz, E. P. 1913b.

ABSENCE OF YELLOW PIGMENT

General. *Microtarsus m. melanocephalus*. Heurn, W. C. 1927.

Blue color due to absence of yellow pigment. *Melopsittacus undulatus*. Seth-Smith, D. 1924.

ERYTHRISM

Abnormal occurrence of red. It is not always certain that a lipochrome pigment is involved. See also under Egg color anomalies.

General. Boetticher, H. 1926; Pelzeln, A. 1865; Rothschild, L. W. 1913b. Many species. Pistone, A. 1891.

Acanthis spinus. Salzmann, E. 1910. *Bambusicola thoracica*. Witherby, H. F. 1914a. *Barnardius*. Mathews, G. M. 1918. *Erithacus*. Butler, E. A. 1904. Fringillidae. Braun, F. 1901. *Lagopus*. Clark, H. L. 1894. *Lagopus scoticus*. Millais, J. G. 1910a. *Perdix montana*. Ingram, C. 1909b. *Phasianus*. Régnier, M. V. 1926b; Witherby, H. F. 1913d. *Platycercus*. Mathews, G. M. 1918. Psittaci. North, A. J. 1904. *Psittacus*. Finn, F. 1910. *Tympanuchus*. Brewster, W. 1895.

Histologic study of feathers showing erythrisism. *Phasianus*. Régnier, M. V. 1926b.

XANTHOCHROISM

General. Wood, C. A. 1924a. *Ligurinus*. Blathwayt, F. L. 1904. *Motacilla*. Leigh, A. G. 1911a. Psittaci. Meyer, A. B. 1882a; North, A. J. 1904. Trochilidae. Hamonville, J. C. 1898a.

Mixed albinism and xanthochroism. Wood, C. A. 1924a.

Melanism

General. Altum, B. 1865b; Boardman, G. A. 1879; Bruchlacher, G. 1867; Butler, A. G. 1904; Caterini, F. 1928; Ceglie, F. 1897; Cole, L. J. 1897; Deane, R. 1876, 1879; Doebner, E. P. 1865b; Fabani, C. 1892d; Giebel, C. G. 1866a; Giglioli, E. H. 1903; Gredler, V. M. 1883; Heumann, G. P. 1922; Heyne, O. 1907; La Fresnaye, F. 1837; Maestri, A. 1871; Mazza, F. 1890; Noble, G. K. 1919; Pavesi, P. 1895; Pelzeln, A. 1865; Picchi, C. 1903; Rensch, B. 1925a; Rothschild, L. W. 1913b.

Many species. Caterini, F. 1928; Minà-Palumbo, F. & Morici-Minà, M. 1898; Pistone, A. 1891; Robbecke, E. 1894; Rollinat, R. 1890; Rothschild, L. W. 1927a; Worthen, C. K. 1896.

Accentor. Fabani, C. 1892c; Stölker, C. 1870a. *Alauda*. Wenig, J. 1930. *Alauda arvensis*. Smith, J. A. 1867a. *Amadina*. Alzani, F. 1913b. *Anas boschas*. Potier de la Varde, R. 1926; Rogeron, G. 1898; Stölker, C. 1870a. Anatidae. Arrigoni degli Oddi, E. 1898b. *Ardea garzetta*. Kenessey von Kenese, L. 1891. *Buteo*. Bailey, B. H. 1912b; Emerson, W. O. 1904. *Buteo latissimus*. Bailey, B. H. 1912b; Ridg-

way, R. 1887a. *Carduelis*. Blake-Knox, H. 1870c. *Carduelis c. carduelis*. Poliakov, G. I. 1917. *Circus*. Arrighi-Griffoli, G. 1894. *Columbina picui*. Spegazzini, C. 1918. *Corvus*. Fiori, A. 1894. *Coturnix*. Arrigoni degli Oddi, E. 1889c. *Coturnix communis*. Sturmiolo, G. 1913. *Fringilla*. Lanfossi, P. 1850; Pelzeln, A. 1886b; Stölker, C. 1870a. *Hirundo*. Collinge, W. E. 1919d; Stölker, C. 1870a; Wood, W. 1872. *Lanius collurio*. Ninni, E. 1908b. *Larus*. Bean, R. A. 1923. *Loxia*. Lanfossi, P. 1850; Stölker, C. 1870a. *Melanocorypha*. Ceglie, F. 1897. *Nyroca affinis*. Cole, L. J. 1897. *Paroaria cucullata*. Meyer, A. B. 1894b. *Parus*. Bunyard, P. F. 1908b; Stölker, C. 1870a. *Parus c. coerulesus*. Collinge, W. E. 1919d. *Passer*. Cremaschi, A. 1889; Hornung, V. 1904. *Perdix*. Pelzeln, A. 1886b. *Pernis*. Elliot, E. A. 1907. *Phasianus*. Hachisuka, M. 1926b; Witherby, H. F. 1913d. *Poëphila*. Butler, A. G. 1902d. Psittaci. North, A. J. 1904. *Psittacus*. Gundlach, J. 1891. *Pyrrhula*. Bianchi, V. L. 1907b; Fiori, A. 1894; Frauenfeld, G. 1863a; Gredler, V. M. 1873; Landois, H. 1897; Macpherson, H. A. 1883e; Nezen, D. E. 1804; Pelzeln, A. 1886b; Stölker, C. 1870a. *Rallus*. Gurney, J. H., Jr. 1891. *Sialia*. Wood, W. 1872. *Sitta*. Kollibay, P. R. 1917. *Sula bassana*. Balfour, H. 1921. *Sylvia*. Schmitz, E. 1909. Trochilidae. Hamonville, J. C. 1898a. *Turdus*. Chapman, F. M. 1893a; Coues, E. B. 1878c; Stölker, C. 1870a; Wood, W. 1872. *Turdus m. migratorius*. Barrows, W. B. 1885b; Coues, E. B. 1878c; Faxon, W. 1886; Lockwood, S. 1880a, b. *Turdus v. viscivorus*. Macpherson, H. A. 1883f. *Uria*. Collett, R. 1898b; Jacobi, A. 1917.

Melanism in nestlings. *Vanellus*. Boyd, A. W. 1930.

Origin and significance of melanism. Includes birds. Klunzinger, C. B. 1903b.

Relation of melanism to geographic distribution. Milne-Edwards, A. 1873; Ridgway, R. 1872.

ASSOCIATION OF COLOR

Geographic distribution. Meyer, R. 1874.

Habits. Moffat, C. B. 1920.

Luteal cells. Many species. Yocom, H. B. & Philipps, B. I. 1923, 1924.

Phylogeny and taxonomy. Tetraonidae. Trips, M. 1900.

Throat color and song. Brehm, C. L. 1855c, 1856a.

Type of nest. Wallace, A. R. 1868a, b; Anon. 1869a.

Vigor. Includes birds. Bonhote, J. L. 1905a.

CAUSES OF COLOR, USUALLY IN PLUMAGE

Books. Text in English. Beddard, F. E. 1892a.

Text in French. Cornevin, C. E. 1895.

General. Altum, B. 1854a, b; Frémineau, H. 1868; Gadow, H. F. 1910; Götz, W. H. 1925b; *Haecker, V. 1890; Jeffries, J. A. 1882a, 1883b; Mallock, A. 1921; Mandoul, H. 1902, 1903; Oustalet, J. F. 1892; Reichenbach, H. G. 1855; Strong, R. M. 1902b, c, 1903, 1904, 1905a, 1915b, 1917c, 1921a, 1927. Includes birds. Sacc, F. 1843. Many species. Rensch, B. 1925c; Schroeder, R. 1880.

Columba. Spöttel, W. 1914. *Eurylaemus*. Wurm, W. 1892. *Gallus*. Ladebeck, E. 1923; Wurm, W. 1892. *Phasianus*. Régner, M. V. 1926b.

Asymmetrical color of the skin. Hutt, F. B. 1929a.

Color in fleshy appendages of bare skin region. Gallinae. Champy, C. & Demay, M. 1930.

Development of color in feathers. Kendall, H. 1903; Read, R. H. 1895. Many species. Holland, T. 1860, 1864; *Strong, R. M. 1902b. *Gallus*. Strong, R. M. 1915b, 1917c.

Sex differences in color. *Eclectus*. Meyer, A. B. 1893.

Tropical heat and light do not produce brilliant colors. Wallace, A. R. 1861.

Vigor as cause of bright colors. Bonhote, J. L. 1904.

Optical or physical colors

Colors due to structural conditions and usually involving melanin pigment secondarily.

General. Bancroft, W. D. & others 1923; Clément, E. C. 1877; Gadow, H.

F. 1882b; Haecker, V. 1890, 1902, 1912; Imhof, G. 1901; Mason, C. W. 1923; Rayleigh, (B). 1919. *Eurylaemus* & *Gallus*. Wurm, W. 1892.

Blue color. The only pigment present in blue feathers is melanin. Many species. Bancroft, W. D. & others 1923; Haecker, V. 1890, 1902; *Haecker, V. & Meyer, G. 1901; Pouchet, G. 1875; Strong, R. M. 1905a, 1927, 1928. *Alcedo*. Stubbs, F. J. 1910a.

Green color. The pigments involved are melanin and a yellow lipochrome. Strong, R. M. 1905a. Many species. Bancroft, W. D. & others 1923. Canary hybrids. Heinroth, O. 1906c. *Dacnis*. *Kniesche, G. 1914.

Violet color. Haecker, V. 1890. Many species. Görnitz, K. & Rensch, B. 1924.

Whiteness. Absence of pigment. Strong, R. M. 1904, 1921a. *Gallus*. Blanchon, H. L. 1901b.

IRIDESCENCE OR METALLIC COLORS

Colors which shift with changes in the angle of reflection. These colors always involve an intense melanin pigmentation of the barbules.

Book. Text in English. Includes birds. Michelson, A. A. 1927.

General. Altum, B. 1854a, b; Brücke, E. W. 1861; *Elsässer, T. 1925; Mallock, A. 1911b; Mandoul, H. 1902, 1903; Michelson, A. A. 1911; Rayleigh, (B.) 1919; Rensch, B. 1923c, 1924a, 1927b.

Columba. Strong, R. M. 1902c, 1903. *Gallus*. Ladebeck, E. 1923. Nectariniidae. Newbigin, M. I. 1896. *Sturnus vulgaris*. Stubbs, F. J. 1912c. Trochilidae. Biedermann, W. 1904; Hodgkinson, A. 1892; Newbigin, M. I. 1896; Weinland, D. F. 1856.

Climatic effect on iridescence. Rensch, B. 1925d.

Function of iridescence. Trochilidae. Charbonnier, H. J. 1919.

Pigmental colors

Involving the presence of a pigment, which can be extracted and which is similar in color to the color produced by the structure.

General. Bogdanoff, A. 1856, 1858a, b; Clément, E. C. 1877; Götz, W. H. 1925b; Haecker, V. 1902, 1921; Jeffries,

J. A. 1882a; Sickel, J. 1847; Völker, O. 1938. Includes birds. MacMunn, C. A. 1883. Birds incidental. Weidenreich, F. 1912. *Eurylaemus* & *Gallus*. Wurm, W. 1892.

Changes in pigmentation at breeding season. *Coccothraustes* & *Loxia*. Heusinger, K. F. 1887b.

Chemical and physiological study. Krukenberg, C. F. 1884.

Connective tissue pigments. Japanese silky fowl. *Gallus*. *Kuklenski, J. 1915.

Development. Birds incidental. Weidenreich, F. 1912.

Experimental feeding effects. *Cyanospiza ciris*. Renshaw, G. 1898.

Origin and nature of pigments. Birds incidental. Millot, J. 1924.

Periosteum pigmentation. *Gallinula*. Hering, E. 1864.

Testis pigments. *Gallus*. Bittner, H. 1925c; Loisel, G. 1904a.

BLOOD PIGMENTS

Chemical and physiological study. Krukenberg, C. F. 1884.

Chemical composition. *Corvus*, *Sylvia*, & *Turdus*. Wicke, W. 1858.

Hemoglobin. (See also under Blood.) Includes *Columba* & *Gallus*. Negri, A. 1902.

Yellow lipochrome in serum. Halliburton, W. D. 1886.

EYE PIGMENTS

Iris. *Phalacrocorax carbo*. Troller, J. 1917.

Retina

General. Kühne, W. 1878.

Pigment epithelium. Figures. *Streptopelia*. Strong, R. M. 1912c.

Post-mortem pigment formation in pigmentless retinas and choroids. *Streptopelia*. *Riddle, O. & LaMer, V. K. 1918.

INTEGUMENTAL PIGMENTS

Feather pigments

Book. Text in German. Feather pigments, pp. 79-84. Schwann, T. 1839.

General. Altum, B. 1854b; Gadow, H. 1910; Götz, W. H. 1925b; Imhof, G.

1901; Montessus, F. B. 1886. Many species. *Haecker, V. 1890. Include birds. Kobelt, A. 1911; Mandoul, H. 1903.

Alcedo. Stubbs, F. J. 1910a. *Columba*. Lewis, G. A. 1871b; Lloyd-Jones, O. 1915; Reclam, C. H. 1846. *Gallus*. Kölliker, R. A. 1887; *Ladebeck, E. 1923; Lippincott, W. A. 1918; Reclam, C. H. 1846; Wurm, W. 1892. *Gallus bankiva*. Ball, S. C. 1933. *Gypaëtus*. Homeyer, E. F. 1883a.

Chemical characteristics. *Krukenberg, C. F. 1881, 1884. *Columba*. Lloyd-Jones, O. 1915.

Chemical relations of feather pigments to porphyrinuria. Krumbiegel, I. 1926.

Development of pigment in nestling down feathers. *Gallus*. Rabl, H. 1894.

Skin pigments

General. Mandoul, H. 1903. Many species. *Lebedinsky, N. G. 1929. *Gallus*. *Barrows, H. R. 1914.

Blue skin. Large blue pigment cells. *Cerionis*. Murie, J. 1872a.

Feet. Hanau, A. 1881. *Anser* & *Gallus*. Goebel, F. 1823.

Integumental papillae about eye. *Phasianus*. Zawadowsky, M. M. & Kritsch, N. J. 1926.

Carotinoid pigment of skin

Correlation of yellow pigment in skin with fecundity. *Gallus*. Blakeslee, A. F., Harris, J. A., Warner, D. E., & Kirkpatrick, W. F. 1917; Harris, J. A., Blakeslee, A. F., & Warner, D. E. 1917; Harris, J. A., Blakeslee, A. F., Warner, D. E., & Kirkpatrick, W. F. 1917; Palmer, L. S. 1919; Palmer, L. S. & Kempster, H. L. 1919b.

Relation to egg laying. *Gallus*. Palmer, L. S. 1919.

LIPOCHROME PIGMENTS

These are fat-soluble non-granular pigments. Many, at least, are carotinoid. Because of lack of information it is not possible to classify fully all of the pigments indicated in this section.

Absence of lipochrome in species that normally have it. Duncker, H. 1927b.

Chemical and physiological study. Krukenberg, C. F. 1884.

Relation of lipochrome pigments to plant carotin. Völker, O. 1934.

Feather lipochromes

General. Desselberger, H. 1930b; Görnitz, K. 1923b; Götz, W. H. 1925b.

Development. Desselberger, H. 1929, 1930b.

Red lipochrome pigments

General. *Calurus*, *Cotinga*, & *Oriolus*. Bogdanoff, A. 1857.

In modified papilliform nestling down feathers on the forehead. *Fulica atra*. Steinbacher, G. 1930.

Pink pigment, chemical study of. Anon. 1872a.

Rose tint on neck. *Diomedea*. Macpherson, A. H. 1889b.

Tetronerythrin. In naked portions of skin, including comb, eyelids, and wattles. Galli. Wurm, W. 1872.

Zoofulvin. Chemical composition. Meyer, A. B. 1881.

Zoorubin. Meyer, A. B. 1881.

Zooerythrin

General. *Phasianus colchicus*. Régnier, M. V. 1926a.

Chemical composition. Meyer, A. B. 1881. *Pyrrhula*. Schereschewsky, H. 1929.

Yellow lipochrome pigments

Absence of yellow pigment. *Microtarsus m. melanocephalus*. Heurn, W. C. 1927.

Fluorescent yellow zooxanthin. Psittaci. Völker, O. 1937.

In blood serum. *Columba* & *Gallus*. Halliburton, W. D. 1886.

Xanthophyll. Yellow pigment of egg yolk, body fat, and blood serum of hen. Relation to xanthophyll of plants. Palmer, L. S. 1915.

Yellow lipochrome pigment of skin. *Gallus*. *Blakeslee, A. F. & Warner, D. E. 1915; Harris, J. A., Blakeslee, A. F., & Warner, D. E. 1917; Harris, J. A., Blakeslee, A. F., Warner, D. E., & Kirkpatrick, W. F. 1917; Knox, C. W. 1931; Palmer, L. S. 1919; Palmer, L. S. & Kempster, H. L. 1919a, b, c.

MELANIN PIGMENTS

Granular dull yellowish pigments, which appear black when clumped.

General. Hodgkinson, W. R. & Sorby, H. C. 1877. Birds incidental. Ehrmann, S. 1890.

Gallus. Haecker, V. 1890, 1921. *Gypaëtus*. Krukenberg, C. F. 1883a. *Ploceidae*. Neunzig, R. 1927b.

Alleged removal of melanin pigment by chromophages. Metchnikoff, E. 1906.

Chemical characteristics. *Pyrrhula*. Schereschewsky, H. 1929.

Factor for black pigmentation. *Gallus*. Hadley, P. B. 1914c. Silky fowl. Stiefel, K. 1926.

Heart melanin pigment. Silky fowl. Stiefel, K. 1926.

Size and shape of melanin granules. Post, H. 1894. *Columba*. Lloyd-Jones, O. 1915. *Columba*, *Munia*, *Passerina*, & *Sterna*. Strong, R. M. 1902b.

Development

In eye. *Gallus*. Smith, D. T. 1920; Szily, A. 1911.

In feathers

General. Bruch, C. W. 1844; Holland, T. 1860; Klee, R. 1886; Kuhn, O. 1928b.

Casuaris. Hasskó, A. 1929b. *Columba*. Lloyd-Jones, O. 1915. Post, H. 1894; Strong, R. M. 1902b. *Eudyples chrysocome*. Wohlaue, E. 1902. *Gallus*. Glasewald, F. K. 1926; Strong, R. M. 1915b, 1917c. *Munia atricapilla*, *Passerina ciris*, *Passerina cyanea*, & *Sterna*. *Strong, R. M. 1902b.

Diet effects. Riddle, O. 1908b. Nestling down feathers. *Gallus*. Rabl, H. 1894.

Significance of mitochondria in development of melanin pigment in embryo. *Gallus*. Rényi, G. S. 1924.

Tyrosin and "dopa" in development of melanin pigment. Includes *Gallus*. Sato, K. & Brecher, L. 1925.

Distribution

General. Bruch, C. W. 1844.

Distribution in developing feather. *Columba* & *Gallus*. Kuhn, O. 1928b.

Distribution by melanophores to developing feather cells. *Columba*. Lloyd-Jones, O. 1915. Post, H. 1894. *Gallus*. Strong, R. M. 1915c. *Munia*, *Passerina*, & *Sterna*. *Strong, R. M. 1902b.

Hyperthyroidization experiments

See also under **Thyroid gland**.

General. Horning, B. & Torrey, H. B. 1923, 1927. *Gallus*. Schwarz, E. 1931. *Pyrrhula*. Schereschewsky, H. 1929.

Antagonistic effect of thyroid gland and ovary. *Gallus*. Torrey, H. B. & Horning, B. 1925b.

Melanophores (Chromatophores)

Large branching cells, which form melanin pigment granules in their cytoplasm. These granules are distributed by the branches to the differentiating epithelial cells of the developing feather.

General. Birds incidental. Borrel, A. 1913.

General description of developing melanophores. *Columba*. Lloyd-Jones, O. 1915; Post, H. 1894; *Strong, R. M. 1902b. *Gallus*. Strong, R. M. 1915b, 1917c. *Munia*, *Passerina*, & *Sterna*. Strong, R. M. 1902b.

Relation to neural tube vestige in coccygeal region. *Anser*. Peyron, A. 1922.

TURACIN

A feather pigment containing copper, first described by Church, A. H. 1870.

General. Beddard, F. E. 1889e; Church, A. H. 1870, 1893a, b, 1913; *Keilin, D. 1926; Schlegel, H. 1857, 1860.

Corythax. Verreaux, J. P. 1871. Musophagidae. Bogdanoff, A. 1862; Giunti, M. 1879. *Turacus*. *Fischer, H. & Hilger, J. 1924; Prior, P. 1923; Quelch, J. J. 1887.

Bleaching turacin by use of water containing very small amount of ammonia. Krumbiegel, I. 1925a, b.

Chemical and physiological studies. Krukenberg, C. F. 1884.

Solubility. *Turacus*. Draper, E. H. 1908.

Spectroscopic studies. Keilin, D. 1926. *Turacus*. Draper, E. H. 1908.

CHANGE IN COLOR

Usually of plumage and mostly involving a molt. See also under **Molt**: Sequence of plumages, and **Sex**.

Books. Text in English. Headley, F. W. 1895b. *Dendragapus* & *Lagopus*. Cartwright, G. 1792.

General. A. R. 1877; Bahr, P. H. 1909; Beebe, C. W. 1907a; Bonhote, J. L. 1900b, 1907; Brehm, C. L. 1853a, b, c, 1857b; Butler, A. G. 1902b, 1907b; Cartwright, B. W. & Harrold, C. G. 1925; Ekstrom, K. 1834; Frauenfeld, G. 1853b, 1873b; Giebel, C. G. 1855b; Gloger, C. W. 1853a, f, 1854f; Götz, G. F. 1781; Heinroth, O. 1898a; Homeyer, E. F. 1853, 1855, 1856; Kleinschmidt, O. 1899; Lazarini, L. 1890; Magretti, P. 1880; Mauduy, —. 1849; Metchnikoff, E. 1906; Müller, J. W. 1853; Neunzig, R. 1927b; Nilsson, S. 1824; Prentiss, D. W. 1890; Read, R. H. 1895; Reichenow, A. 1877a; Rey, J. G. 1893; Röttiger, A. 1877; Rüdiger, E. 1878a; Russ, K. F. 1892; Samuel, S. 1870; Schlegel, H. 1852, 1853b, 1854, 1855a, b; Sievertsov, N. A. 1863–65; Stone, W. 1896, 1901a; Tschusi zu Schmidhoffen, V. 1866a; Van Someren, V. G. 1919; Walter, A. 1877b; Anon. 1866. Many species. Blyth, E. 1837c; *Meves, F. W. 1855; Müller, J. W. 1855. Include birds. Bachman, J. 1839; Martin, L. 1879. Exotic birds. Devy, L. 1914.

Aeginthidae. Rauber, G. 1904. *Anas*. Yarrell, W. 1833a. *Anas boschas*. Schiavuzzi, B. 1884. *Anas marila*. Hornschuch, C. F. & Schilling, W. 1823. *Barnardius*. Tavistock, —. 1917a. *Budytes*. Brehm, C. L. 1857a. *Calidris*. Millais, J. G. 1896. *Carbo*. Yarrell, W. 1833a. *Conurus carolinensis*. Nie-meier, W. 1867. *Crex*. Bonhote, J. L. 1900b. *Crocethia alba*. Chapman, F. M. 1896a. *Cyanospiza*. Renshaw, G. 1897, 1898. *Dolichonyx*. Chapman, F. M. 1893b, 1897. *Elsemyornis melanops*. Mathews, G. M. 1914b. *Eurylaemus*. Wurm, W. 1892. Fringillidae. Hessler, A. 1854c. *Gallus*. Wurm, W. 1892. *Harelda*. Millais, J. G. 1896. *Lagopus*. Goebel, H. 1873b. *Lanius ludovicianus*. Miller, A. H. 1928. *Larus*. Beebe, C. W. 1906d; Yarrell, W. 1833a. *Larus melanocephalus*. Ninni, A. P. 1883. *Larus minutus*. Macpherson, H. A. 1899b. *Loxia*. Hadfield, H. 1862. *Loxia curvirostra*. Ticehurst, C. B. 1915b. *Motacilla*. Brehm, C. L. 1857a. *Munia*. *Strong, R. M. 1902b. *Muscicapa*. Martin, L. 1853a. *Oidemia nigra*. Martin, L. 1853b. Passeres. Dwight, J. 1900d; Medreczky, S. 1899. *Passerina*. *Strong, R. M. 1902b. *Pelidina a. alpina*. Chapman, F. M. 1896a. *Phalacrocorax carbo*. Troller, J. 1917. *Pini-cola*. Hadfield, H. 1862. *Platyercus*. Mathews, G. M. 1918; Tavistock, —.

1917a. *Plectrophenax nivalis*. Chapman, F. M. 1896d. Ploceidae. Butler, A. G. 1897e. *Podiceps*. Millais, J. G. 1896. *Poephila gouldiae*. Butler, A. G. 1902d. *Pterocles setarius*. Olphe-Galliard, V. A. 1855. *Pyrrhula*. Frauenfeld, G. 1866b; Schereschewsky, H. 1929. *Sterna*. Brehm, C. L. 1854b; Strong, R. M. 1902b. *Tadorna*. Hoeven, J. 1866. Tetraonidae. Jameson, —. 1820. *Tringa*. Yarrell, W. 1833a.

Blue to white at molt. *Gallus*. Lippincott, W. A. 1920a.

Confinement effects on color. Mailard, L. 1910. *Acanthis*. Wormald, H. 1909a. Nectariniidae. Millar, H. 1920.

Early correct observations of color change by molt. Book. Text in English. *Lagopus*. Cartwright, G. 1792.

Gray to red. *Megascops*. Chadbourne, A. P. 1896.

Loss of color. Brehm, C. L. 1853a.

Male sex hormone effects. *Anas*. Parhon, C. J. & Parhon, C. 1922b.

Metallic colors lost at molt. *Lamprocolius*. Neumann, O. 1907.

Senile changes. Butter, J. 1817-20.

Change in color without molt

See also Adventitious coloration.

Book. Text in English. *Larus*. Audubon, J. J. 1831-39, Vol. 4, p. 213.

General. Allen, J. A. 1886a, 1896a, 1900a; Fatio, V. 1866; Fleming, J. 1820; Gaetke, H. 1854; Gloger, C. W. 1854a; Grant, C. H. 1908; Hartert, E. J. 1897; Hoxie, W. 1886a, 1887a; Le Souëf, W. H. 1903a; Lucas, F. A. 1897a; Meves, F. W. 1862a, b, 1879; Schenckling-Prévôt, C. 1897a, 1898b; Schlegel, H. 1852; Sievertsov, N. A. 1863-65; Weinland, D. F. 1856; Whitear, W. 1818. Many species. Meves, F. W. 1855. Birds of prey. Meerwarth, H. 1898.

Buteo. Birtwell, F. J. 1903. *Chrysotis*. Birtwell, F. J. 1899b. *Ciconia nigra*. Montagu, G. 1818. *Coereba cyanea*. Reichenow, A. 1891a. *Dolichonyx*. Chadbourne, A. P. 1897. *Gypaëtus barbatus*. Meves, F. W. 1862a. *Megalornis g. grus*. Meves, F. W. 1862b. *Megascops*. Birtwell, F. J. 1899a; Chadbourne, A. P. 1896. *Mergus*. Weinland, D. F. 1859. *Merops*. Grant, C. H. 1908. Musophagidae. Schlegel, H. 1857, 1860.

Passerina. Birtwell, F. J. 1900; Dwight, J. 1900c. *Sylvia*. Weinland, D. F. 1859. *Trochilus*. Schlegel, H. 1857.

ABRASION OR WEAR OF FEATHERS

Dwight, J. 1905; Görnitz, K. 1927; Grinnell, J. 1902; *Stone, W. 1896. *Plectrophenax*. *Chapman, F. M. 1896d.

Breaking off of barb and barbule ends exposing differently colored portions. Görnitz, K. 1927. *Carpodacus*. Grinnell, J. 1911a.

APTOSOCHROMATISM

This term was coined by E. Coues (Hoxie, W. 1886a) to indicate supposed alteration of color by changes in the distribution of pigment in the feather or by new pigment entering the feather. This erroneous conception has appeared many times and especially in publications by the following authors: Birtwell, F. J. 1899a, b, 1900; Chadbourne, A. P. 1896, 1897; Fatio, V. 1866; Gaetke, H. 1854; Keeler, C. A. 1893; Meerwarth, H. 1898; Millais, J. G. 1896; Sharpe, R. B. and others 1874-98 (Vol. 10, 1885); Weinland, D. F. 1856, 1859.

Alleged change of color to white in one day after being rescued from cat. *Sturnus*. Weinland, D. F. 1859.

Explanations of the phenomena involved in so-called aptosochromatism may be found in publications by the following authors: Allen, J. A. 1886a, 1896a, 1900a; Chapman, F. M. 1896d; Dwight, J. 1900c; Meves, F. W. 1855; Stone, W. 1896; Strong, R. M. 1902b.

BLEACHING OR FADING

General. Bonhote, J. L. 1904; Weinland, D. F. 1856.

Dilute hydrochloric acid as cause. Meves, F. W. 1862a.

Light effects. Cartwright, B. W. & Harrold, C. G. 1925; Dwight, J. 1905. *Gallus* & *Larus*. Courty, G. 1912.

Loss of red color due to turacin by soaking in alkaline water. *Corythaix*, *Hapaloderma*, and Musophagidae. Krumbiegel, I. 1925a, b. Verreaux, J. P. 1871. *Turacus*. Quelch, J. J. 1887; Schlegel, H. 1860.

Washing in water. *Grus*. Homeyer, E. F. 1864b.

Climatic effects

Book. Text in German. Gloger, C. W. 1833.

General. Fatio, V. 1866. *Gallinae*. Blanchon, H. L. 1901a.

Experimental studies of effects of humidity. Lydekker, R. 1908-09.

Diet changes, including experimental feeding

General. Beebe, C. W. 1908; Goldner, H. 1887; Heumann, G. P. 1922; Sauermann, C. 1890; Thurn, E. F. 1884.

Anas. Baer, W. 1903a. *Columba*. Pribyl, L. 1889; *Sauermann, C. 1889. *Coturnix*. Cavazza, F. 1913. *Dendrocopus*. Baer, W. 1903a. *Gallus*. *Sauermann, C. 1889. *Passerina*. Butler, A. G. 1897a. *Pyrrhula*. Larionov, W. T. 1928. *Serinus*. Brézol, H. 1888; *Sauermann, C. 1889. Insect-eating birds. Sauermann, C. 1891b.

VARIOUS SUBSTANCES IN DIET

Aniline dye feeding. Nestling. *Larus*. Braune, —. 1910b.

Cayenne pepper. *Agapornis*. Watson, W. H. 1890. *Galli*. Blanchon, H. L. 1901a.

Liver. 103 species. La Riboisière, J. 1908.

Red stain for eggs and skeleton. *Galus*. Joly, N. 1860.

Skin color. Changes due to feeding pimientto pepper. *Gallus*. Brown, W. L. 1930.

Thyroid extract. *Columba*. Blasi, D. 1925. *Gallus*. Blasi, D. 1925; Giacomini, E. 1924; Giacomini, G. 1926; Sinton, P. & Simmonet, H. 1929. *Pyrrhula*. Schereschewsky, H. 1929.

Seasonal changes

General. *Leucosticte tephrocotis littoralis*. Shaw, W. T. 1936. *Zosterops*. North, A. J. 1896b.

Light effects. Beebe, C. W. 1908.

Liver color. *Gallus*. Weber, E. H. 1850.

Summer change in beak and plumage. *Pyromelana*. Butler, A. G. 1916.

Winter change to white. Barrett-Hamilton, G. E. 1904a; Beddard, F. E. 1903b; Jäger, G. 1869. *Tetrao* [*Lagopus*]. Caire, —. 1854.

Unfeathered areas of head: color changes

Change of color of beak. *Gallinula*. Alexander, W. B. 1919. *Gallinula c. chloropus*. Pitt, F. 1918a. *Loxia*. Tyrer, R. 1877.

Iris of eye. *Phalacrocorax carbo*. Troller, J. 1917.

Shield. *Gallinula c. chloropus*. Pitt, F. 1918a.

Shutting off blood supply in excitement. Biedermann, R. 1898.

Skin color changes after egg laying, during emotional disturbances, in exhaustion, mating activities, and pain. *Gallus*. Schjelderup-Ebbe, T. 1916.

CONCEALING OR PROTECTIVE COLORATION

Books. Text in English. Beddard, F. E. 1892a; Dixon, C. 1897a; Poulton, E. B. 1890; Thayer, G. H. 1909.

Text in German. Magnus, H. F. 1881; Reichenau, W. 1887.

General. Allen, F. H. 1912; Allen, J. A. 1911; Argyll, G. D. 1868; Armit, W. E. 1878; Bannerman, D. A. 1915; Barbour, T. 1913, 1921; Barbour, T. & Phillips, J. C. 1911; Beebe, C. W., Hartley, G. I., and others 1917; Belt, T. 1877; Bird, M. C. 1903; Butler, A. G. 1908b, 1912; Chapman, F. M. 1910; Clark, H. L. 1893b; Csörgy, T. 1922; Dunlop, E. B. 1910; Frisch, K. 1923; Fry, H. 1909; Gadow, H. F. 1910; Haagner, A. K. 1908a; Heikertinger, F. 1921; Henderson, J. 1913a; Henning, H. 1916; Herman, O. 1897; Keeler, C. A. 1893; Kerschner, L. 1886; Kleinschmidt, O. 1925; Le Souëf, W. H. 1902a; Lowe, P. R. 1915a; Lucanus, F. K. 1902; Lydekker, R. 1908-09; *McAtee, W. L. 1912b; McGregor, R. C. 1899; Macpherson, H. B. 1909b; Mata, A. B. 1923; Meyer, A. B. 1869; Mottram, J. C. 1915; Murray, A. 1868; Pycraft, W. P. 1907c; Rockwell, R. B. 1908; Schuster, W. 1902a; Summerhayes, V. S. & Elton, C. S. 1928; Swynnerton, C. F. 1915a; Thayer, A. H. 1896, 1900; Tristram, H. B. 1893; Verrill, A. E. 1897; Wallace, A. R. 1868b; Weber, S. A. 1912. Many species. Barbour, T. & Phillips, J. C. 1911; Pässler, C. W. 1860; Reichenau, W. 1877; Swynnerton, C. F. 1916. Include birds. Giacomelli, E. 1905; Roosevelt, T. 1911, 1924; Thayer, A. H. 1910, 1911, 1912. Birds incidental. Mottram, J. C. & Green, F. W. 1918;

Picado, C. 1910; Puschnig, R. 1917. Nesting birds. Kneeland, S. 1868.

Botaurus. Barrows, W. B. 1913. *Caprimulgus europaeus*. Heinroth, O. 1909a. *Certhia familiaris*. Hermann, R. 1908. Charadriidae. Dewar, J. M. 1912. *Charadrius*. Aplin, O. V. 1903b. *Charadrius h. hiaticula*. Pycraft, W. P. 1908b. *Chrysomitris*. Gillman, H. 1876. *Gallus*. Davenport, C. B. 1908a; Hess, C. 1917a; Pearl, R. 1911a. *Lagopus*. Grinnell, J. 1900; Wurm, W. 1900a. *Oxyechus v. vociferus*. Pickwell, G. W. 1925a. *Perdix*. Lintia, D. 1908. Sterninae. Bigney, A. J. 1902. *Struthio*. Schreiner, S. C. 1897.

Experimental study. Includes birds. *Swynnerton, C. F. 1919.

Immobility. Relation to concealing coloration. Arenberg, E. 1911.

NESTLING BIRDS

General. Butterfield, W. C. 1905a.

Hatching, nestlings at. Pycraft, W. P. 1902c.

Mouth parts. Butterfield, W. C. 1918; Swynnerton, C. F. 1915a.

Concealing coloration in eggs

General. Butler, A. G. 1890; Ellison, A. 1890; Fox, W. S. 1899a; Grensted, F. F. 1889; Hewetson, H. B. 1892; Hunt, H. W. 1888; M'Aldowie, A. M. 1886; Potts, T. H. 1872; Swynnerton, C. F. 1915a, 1917a; Titchener, E. B. 1889, 1890b; Wallace, A. R. 1889. Many species. Lucas, A. H. 1887.

Eggs daubed with clay. *Corvus mone-dula*. Wilesworth, J. 1910.

Insects eaten by birds

General. Colthrup, C. W. 1913-14; Curtis, W. P. 1913; Finn, F. 1907; Judd, S. D. 1899b.

Concealing coloration of insects not always effective against birds. Judd, S. D. 1899b.

Moths. Stiff, A. T. 1912.

DICHROMATISM OR COLOR DIMORPHISM

Two colorations present in a species, often with no sex correlation.

Book. Text in English. Includes birds. Beddard, F. E. 1892a.

General. Buller, W. L. 1895b.

Ardeae. Bangs, O. 1915. *Buteo solitari-us*. Henshaw, H. W. 1902. *Carpodacus*. McGregor, R. C. 1901. Falconoidea. Bangs, O. 1915. *Megascops*. Hasbrouck, E. M. 1893. *Microscelis leucocephalus*. Stresemann, E. 1923b. *Otus asio naevius*. Michener, E. 1839. *Puffinus*. Loomis, L. M. 1919a. *Scops [Otus] asio*. Shorten, J. W. 1885. *Syrnium aluco*. Hasbrouck, E. M. 1892.

Sex dichromatism

General. *Gallus*. Ssirnew, P. J. 1924.

Dichromatism in both sexes. Strese-mann, E. 1925b.

DIRECTIVE COLORATION

General. Baskett, J. N. 1910; Keeler, C. A. 1893; Pycraft, W. P. 1907c; Thayer, A. H. 1900. Many species. Swynnerton, C. F. 1916. Includes birds. Todd, J. E. 1888. Falcones. Seton, E. T. 1897. Passeriformes. *Tracy, H. C. 1910. Ploceidae. Chapin, J. P. 1917; Rey, J. G. 1901. Strigidae. Seton, E. T. 1897.

Bright color of mouth region in nestlings as aid to parent in feeding. See also under skin color of naked areas. Dewar, J. M. 1908a. *Poëphila mira-bilis*. Butler, A. G. 1916-17.

Revealing colors. Henderson, J. 1913a.

ENVIRONMENTAL EFFECTS ON COLORATION

General. Gloger, C. W. 1856b; Harts-horne, H. 1873. Include birds. Bon-hote, J. L. 1904; Schnelle, K. 1874.

Climatic effects. *Görnitz, K. 1923a, b; Grinnell, J. 1910.

Plumage color. *Alauda* & *Mergus*. Cerva, F. 1920.

Tropical heat and light do not pro-duce brilliant colors. Wallace, A. R. 1861.

Weather and climate effects on in-tensity of pigmentation. Many species. Banks, E. 1925.

MIMICRY IN COLORATION

Book. Text in English. Includes birds. Beddard, F. E. 1892a.

General. Fabani, C. 1892f; Tristram, H. B. 1893. Include birds. Manders, N.

1911; Swynnerton, C. F. 1919; Wallace, A. R. 1867a. *Gallus* & *Numida*. Finn, F. 1902b.

To objects unacceptable as food. Swynnerton, C. F. 1915a.

MIMICRY IN INSECTS

Experiments with birds. Finn, F. 1899b.

Insects eaten by birds. Pocock, R. I. 1911b.

Relation to birds. Finn, F. 1896.

PATTERN IN COLORATION

Books. Text in English. *Lagopus scoticus*. Lovat, S. J. and others 1911.

Text in German. Goldschmidt, R. 1931.

General. Curry, A. V. 1890; Keeler, C. A. 1893; Kruimel, J. H. 1916; Lowe, P. R. 1915a; Volčaneckij, I. 1927. Many species. Haecker, V. 1888; *Martorelli, G. 1898. Include birds. Eimer, G. H. 1883a, b.

Aegialitis. Lowe, P. R. 1914. *Ampeelis garrulus*. Schaanning, H. T. 1917; Schlegel, R. 1893. Anatidae. Bonhote, J. L. 1907. *Charadrius*. Lowe, P. R. 1914. *Columba*. Ghigi, A. 1908d; Loisel, G. 1905e. Columbidae. Whitman, C. O. 1907. *Colymbus glacialis*. Smalley, F. W. 1909b. *Euplocamus* hybrids. Mudge, G. P. 1913. *Gallus*. Agar, W. E. 1924; Eliot, T. S. 1928; Pearl, R. & Boring, A. M. 1914. *Gennaeus*. Ghigi, A. 1908a, d. *Lagopus scoticus*. Wilson, E. A. 1910. *Lanius*. *Schiebel, G. 1906. *Motacilla alba*. Sachtleben, H. 1922b. *Phasianus*. Thomas, R. H. 1912b, 1914, 1916. *Sterna dougalli* & *S. hirundo*. Jones, L. 1904c.

Barring in color pattern. *Gallus*. Goodale, H. D. 1909; Spillman, W. J. 1909.

Correlation with diversity in structure. Charadriidae. Lowe, P. R. 1933b.

Flight appearance seen from below. Falcones. Seton, E. T. 1897.

Spangled pattern. Symmetry. *Gallus*. Dunn, L. C. & Landauer, W. 1930.

Wing color pattern. Reichling, H. 1915. *Circus*. Csörgy, T. 1917.

Development

General. Butler, A. G. 1918; Eimer, G. H. 1887; Kuhn, O. & Kuhn, J. 1926. Includes birds. *Allen, G. M. 1914.

Columba. Kuhn, O. 1928b. *Gallus*. Dunn, L. C. & Landauer, W. 1930; Juhn, M. & Fraps, R. M. 1934; Kuhn, O. 1928b; Lillie, F. R. 1932a. *Numida*. Hardesty, M. 1933. Nestlings. *Sterna*. Ingram, C. 1916.

Differential of pigment distribution in color pattern development. Kuhn, O. & Kuhn, J. 1926.

Experimental studies. *Gallus*. Landauer, W. 1930b.

Evolution of color pattern

General. *Allen, G. M. 1914; Bonhote, J. L. 1901b; Eimer, G. H. 1887; Kerschner, L. 1886. *Columba*. Loisel, G. 1905e. Phasianidae. Ghigi, A. 1903b. *Querquedula*. Allen, G. M. 1920. Turdidae. *Gengler, J. 1914.

Origin and genetic relations. *Columba*. Whitman, C. O. 1904b.

Experimental studies

Breeding experiments. Columbidae. *Whitman, C. O. 1919b.

Successive removal of feathers. *Gallus*. Pearl, R. & Boring, A. M. 1914. Silver-spangled fowl. Landauer, W. & Dunn, L. C. 1930b.

SEX HORMONES

Gonad transplantation, effects on color pattern. Caridroit, F. 1925a, 1926.

Injections. *Gallus*. *Juhn, M., Faulkner, G. H., & Gustavson, R. G. 1931. Female hormone. *Gallus*. Lillie, F. R. 1932b.

THYROID GLAND

Excessive doses of thyroid extract, effects on color pattern. *Gallus*. Martin, J. H. 1929a.

Thyroxin injection. *Gallus*. Lillie, F. R. 1932b.

SEXUAL COLORATION

Book. Text in English. Includes birds. Beddard, F. E. 1892a.

Determination of sex. Argyll, G. D. 1868.

Relation to nesting habits. Wallace, A. R. 1868a, b.

Sex hormone, effects on color of

Beak and foot color. Male sex hormone effects. *Larus ridibundus*. van Oordt, G. J. & Junge, G. C. 1930.

Plumage. *Larus ridibundus*. van Oordt, G. J. & Junge, G. C. 1930.

WARNING COLORS

Book. Text in English. Poulton, E. B. 1890.

General. Finn, F. 1912. Many species. Swynnerton, C. F. 1916. Includes birds. Roosevelt, T. 1911, 1924. Birds incidental. Puschnig, R. 1917. *Passeriformes*. Tracy, H. C. 1910.

Experimental study. Confined animals do not necessarily respond to sight of food as wild animals do. *McAtee, W. L. 1912b.

Insect warning colors in relation to birds

General. Finn, F. 1896.

Butterflies. Experiments to test effectiveness. Lucas, F. A. 1898.

Experiments with birds. Finn, F. 1899b.

Insect warning colors effective against birds. Judd, S. D. 1899b.

CONNECTIVE TISSUE

The connective tissues are also included in numerous publications not mentioned in this section and especially in descriptions of the histologic structure of various organs.

Experimental growth of connective tissue in tissue culture. Ebeling, A. H. 1913, 1914.

Fascia. *Aptenodytes patagonica*. Reid, J. 1835.

Lympho-granulopoiesis in areolar connective tissue. *Gallus*. Dantschakoff, W. 1916c, d.

Muscle connective tissue. Gebhardt, W. 1914; Schiefferdecker, P. 1913.

Tissue of sinus rhomboidalis. *Columba*, *Gallus*, & *Passer*. Schaffer, J. 1909, 1910.

Cells

General. Solucha, N. P. 1908.

Fibroblasts and macrophages. Herrmann, R. 1926; Jasswoin, G. 1929.

Mast cells. Herrmann, R. 1926.

HISTIOCYTES

Clasmatocytes, fixed macrophages or reticulo-endothelial cells.

General. *Gallus*. Herrmann, R. 1926.

Relative distribution in loose reticular mesenchyme of various organs in seven-day embryo. *Gallus*. Beck, C. S. 1922.

Collagenous fibers

Development. *Columba*. Livini, F. 1909b, 1910b. *Gallus*. Coca, A. F. 1906; Laguesse, E. 1912b, 1924; Livini, F. 1910b.

Distribution in parathyroid and thyroid glands. *Columba*. Livini, F. 1909b.

Development of connective tissue

General. Rauber, A. A. 1877c. Birds incidental. Merkel, F. S. 1909. *Gallus*. Baitzell, G. A. 1924, 1925; *Dantschakoff, W. 1908b, 1909a, b; Haff, R. 1914; Szily, A. 1908.

Development of vacuoles and neutral red granules in connective tissue cells under abnormal conditions. Prigosen, R. E. 1921.

Tendon cell development. *Gallus*. Loevy, S. 1913.

Visceral connective tissue. *Anas* & *Gallus*. Fischel, A. 1913.

DEVELOPMENT OF CONNECTIVE TISSUE IN EYE

General. *Gallus*. *Szily, A. 1908.

In cornea. *Gallus*. Laguesse, E. 1923a, b, 1924, 1926a, b.

ADIPOSE TISSUE

Chemical composition and structure. Anser. Weiser, S. & Zaitschek, A. 1902. *Gallus*. Zaitschek, A. 1903.

Development. Anser. Mayer, A., Rathery, F., Schaeffer, G., & Terroine, E. F. 1914.

Histologic and experimental study. *Columba* & *Gallus*. *Dogliotti, G. C. 1929.

In cartilage and ligaments. Many species. Lubosch, W. 1924.

ELASTIC TISSUE

General. Renaut, J. L. 1875.

Development. *Columba*. Livini, F. 1910b. *Gallus*. Laguesse, E. 1912b; Livini, F. 1910b; Nakai, M. 1905.

Elastic fibers: development in heart. *Gallus*. Rizzo, A. 1901.

Distribution in

Blood vessels. Many species. Pfister, H. I. 1927.

Heart. *Gallus*. Rizzo, A. 1901.

Ovary and oviduct. Includes birds. Pandolfini, R. & Ragnotti, G. 1900.

RETICULAR CONNECTIVE TISSUE

Histochemistry. Includes *Columba*. Lehrell, F. 1903.

Occurrence in liver. *Columba* & *Gallus*. Schumkow-Trubin, K. G. 1909.

TENDONS

General. *Columba*, *Fringilla*, & *Gallus*. Ranvier, L. A. 1890.

Foot tendons. *Gallus*. Kaufmann-Wolf, M. 1908.

Modifications of connective tissue in tendons. Includes *Gallus*. Renaut, J. L. 1872.

TOE CONNECTIVE TISSUE STRUCTURES

Chondroid bodies on or between tendons. *Buteo*, *Columba*, *Corvus*, & *Passer*. Schaffer, J. 1902b, 1903. *Gallus*. Schaffer, J. 1902b. *Numenius*, *Scelopar*, *Sula*, & *Tetrao*. Schaffer, J. 1903.

Fibrocartilage in tendons. *Anas*, *Columba*, *Fringilla*, & *Gallus*. Ranvier, L. A. 1889.

Special chondroid type having fat infiltration, found in toes. *Anser*, *Athene*, *Bonasa*, *Cuculus*, *Gallus*, *Garrulus*, *Nucifraga*, *Passer*, *Tetrao*, & *Turdus*. Schumacher, S. 1915b.

CONSERVATION

See also under **Economic ornithology**. For organizations more or less actively interested in promoting the conservation of bird life, see Bull. No. 4 of the International Committee for Bird Protection.

Books. Text in English. Baynes, E. H. 1915; Blanchan, N. 1902; Chase, H. 1913; *Forbush, E. H. 1907, 1908a, b, 1913b; Gladstone, H. S. 1919; Horna-

day, W. T. 1913, 1914; Howell, A. H. 1924; Lange, D. 1899; Loyd, L. R. 1924; Meinertzhagen, R. 1930; Pearson, T. G. 1923; Pirnie, M. D. 1935; Ralfe, P. G. 1905; Rich, W. H. 1907; Sass, H. R. 1929. *Colinus*. Stoddard, H. L. 1931. *Falconoidea*. May, J. B. 1935. *Lagopus*. Lovat, S. J. and others 1911. *Syrhaptes paradoxus*. Tegetmeier, W. B. 1888.

Text in German. Eckardt, W. R. 1910b.

General. Allen, A. A. 1914a; Baerg, W. J. 1931; Chatel, V. 1857; Dutcher, W. 1897; Frauenfeld, G. R. 1871, 1873a; Haenel, K. 1914; Henshaw, H. W. 1908a; Hornaday, W. T. 1898; Le Compte, E. L. 1927b; Lósy, J. 1911; McAtee, W. L. 1932c, e; McLouth, C. D. 1893; Montessus, F. B. 1896; Montgomery, T. H. 1906; Palmer, T. S. 1901; Pearson, T. G. 1933b; Phillips, J. C. 1932; Ritzema Bos, J. 1901; Russ, K. F. 1891; Schenk, J. 1923-24; Schillings, C. G. 1914; Siedlecki, M. 1933, 1934; Spiker, C. J. 1931; Szeöts, B. 1916; Whitney, T. H. 1914; Wolford, H. L. 1854.

CONSERVATION IN VARIOUS REGIONS

America

NORTH AMERICA

General. Dutcher, W. 1897. Game birds. Henshaw, H. W. 1915. *Sula* [*Moris*] *bassana*. Wynne-Edwards, V. C. 1935a.

Alaska. Pribilof Islands. Osgood, W. H., Preble, E. A., & Parker, G. H. 1915.

Canada. Hewitt, C. G. 1914.

Labrador. Townsend, C. W. 1916a.

United States

General. Hicks, L. E. 1932b, d.

Alabama. Book. Text in English. Howell, A. H. 1924.

Colorado. Cooke, W. W. 1898.

Louisiana. Bailey, A. M. 1919.

Massachusetts. Forbush, E. H. 1905a, b, 1909-19. Book. Text in English. Forbush, E. H. 1907, 1912, 1913b.

Missouri. Widmann, O. 1907a.

Ohio. Dury, C. 1885. *Colinus*. Ken-deigh, S. C. 1933.

Oklahoma. Nice, M. M. & Nice, L. B. 1924.

Pennsylvania. Surface, H. A. 1908.

West Virginia. Brooks, E. A. 1916b.

SOUTH AMERICA

Peru. Sea coast and islands. Murphy, R. C. 1920.

Australia

General. French, C. J. 1902.

Europe

Germany. Altum, B. 1891c; Plačzek, B. 1901; Walter, J. 1892; Wharton, W. P. 1914.

Hungary. Csörgey, T. 1911, 1912, 1913, 1921; Schenk, J. 1923-24. Book. Text in English. Herman, O. 1907c.

Italy. Passerini, N. 1900.

Fiji Islands and New Zealand

General. Nutting, C. C., Wylie, R. B., Thomas, A. C., & Stoner, D. 1924.

Philippine Islands

General. McGregor, R. C. 1920.

CONSERVATION OF VARIOUS BIRDS

Aix sponsa. Fisher, A. K. 1902.
Aquila. Oberholser, H. C. 1906.
Branta bernicla hrota. Phillips, J. C. 1932.
Charadrioidae. America. Wetmore, A. 1927b.
Colinus v. virginianus. Le Compte, E. L. 1927a, c. Stoddard, H. L. 1926b.
Columba f. fasciata. Grinnell, J. 1913.
Egretta. Chapman, F. M. 1907a.
Haliaeetus. Oberholser, H. C. 1906.
Haliaeetus leucocephalus alascanus. Crabb, E. D. 1922.
Lariidae. Dutcher, W. 1902.
Lophortyx c. californica. *Sumner, E. L. 1935.
Olor buccinator. Coale, H. K. 1915.
Pedioecetes phasianellus campestris. Johnson, C. E. 1934.
Phasianus colchicus torquatus. Leffingwell, D. J. 1928.
Philohela minor. Fisher, A. K. 1902.
Somateria. Townsend, C. W. 1914.
Tympanuchus cupido americanus. Gross, A. O. 1930; Johnson, C. E. 1934.

Cage-bird traffic of the United States. Olds, H. W. 1906.

Causes of change in abundance. Galli-Valerio, B. 1910.

Danish heather plantations: value in preservation of birds. Skovgaard, P. 1925c.

Domestication as method for saving species. Duerden, J. E. 1917.

Experimental changes in flora. Effects on bird population. Longstaff, T. G. 1926.

International bird protection. Chernel von Chernalhaza, I. 1920.

Lack of bird protection in Italy. Herrick, F. H. 1906.

Military carrier-pigeons: protection. McAtee, W. L. 1918f.

Millinery trade. List of birds used. Chapman, F. M. 1886.

Protection from boys. McLouth, C. D. 1893.

Recolonization experiment. *Sterna hirundo*. Jackson, C. F. & Allan, P. F. 1931.

Relation of conservation to agriculture. Olds, H. W. 1903.

Restoration of nearly extinct species by protection in Egypt. *Ardea [Bubulcus] ibis*. McAtee, W. L. 1923c.

Water for birds. Vogt, W. 1937.

DESTRUCTION OF BIRDS

General. Shufeldt, R. W. 1893f.
 Eagles in Alaska. Willett, G. 1927.
 South American birds. Miller, L. E. 1914.
Strigidae. Shufeldt, R. W. 1915e.

Destruction of *Gymnogyps* for quills. Chapman, F. M. 1917a.

Undesirable destruction of *Falconinae*. McAtee, W. L. 1926b.

Wading bird rookery. Christy, B. H. 1928.

Destruction of birds by

Corvus. Brooks, A. 1925a.

Domestic cat. Control. Forbush, E. H. 1916.

Millinery trade. *Sterna*. Chapman, F. M. 1899.

Noxious animal extermination. Palmer, T. S. 1897.

Troglodytes aëdon. Sherman, A. R. 1925c.

POISONING OPERATIONS

General. McAtee, W. L. 1917c.

Destruction of *Lophortyx c. californica* by strychnine sulfate, used in poisoning mammals. Pierce, C. C. & Clegg, M. T. 1915, 1916.

Extirpation of native birds. (See also under Extinction.) Verrill, A. E. 1904.

Extinction danger. Shore bird species. Cooke, W. W. 1915d. *Tympanuchus cupido*. Gross, A. O. 1923b.

EDUCATION

Arbor and Bird Day. Gross, A. O. & Forbes, S. A. 1909.

Bird Day in the schools. Palmer, T. S. 1896.

Program. [Winship, A. E.] 1894. Book. Text in English. Babcock, C. A. 1901.

GAME BIRD CONSERVATION

Book. Text in English. Chase, H. 1913.

General. Bourdillon, H. 1910; Collinge, W. E. 1918c; Leopold, A. 1931; McAtee, W. L. 1930b; Palmer, T. S. 1905.

Increase in food supply for ducks in northern Ontario. Mickle, G. R. 1913.

Records of duck shooting. Relation to abundance. Bergtold, W. H. 1928b.

Value of game protection. Palmer, T. S. 1905.

Propagation

Books. Text in English. Chase, H. 1913; Job, H. K. 1915b, 1923.

General. Job, H. K. 1915a; McAtee, W. L. 1927d, 1930b.

Game birds suitable for introduction to the United States. McAtee, W. L. 1929b.

Moor management. McAtee, W. L. 1917g. Book. Text in English. Lovat, S. J. 1911.

LEGISLATION

General. Collins, W. O. 1861; Dodge, J. R. 1865; Palmer, T. S. 1900a.

English legislation. Book. Text in English. Nelson, W. 1732.

METHODS AND ARRANGEMENT FOR ATTRACTING BIRDS TO AN AREA

Book. Text in English. Blanchan, N. 1902.

General. Edson, W. L. 1918; McAtee, W. L. 1914c, 1916d, 1917e, 1918a.

Artificial nests. Hugues, F. 1914.

Attempt to restore cliff swallow to New Jersey. Bowdish, B. S. 1930.

Golf courses. McAtee, W. L. 1921a, 1922c.

Planting and management for attracting birds. Hicks, L. E. 1932d.

Useful plants. McAtee, W. L. 1909, 1917f, h.

Wood lots. McAtee, W. L. 1929a.

Nest box construction

General. Dearborn, N. 1914; Jacobs, J. W. 1909; Kalmbach, E. R. & McAtee, W. L. 1925; Szemere, L. 1926.

Use of gourds as bird houses. McAtee, W. L. & Peattie, J. H. 1929.

REFUGES AND SANCTUARIES

General. Longstaff, T. G. 1926; McAtee, W. L. 1921b, 1931c, 1932a, c; Pearson, T. G. & Coward, T. A. 1936.

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General. *Perdix perdix*. Olds, H. W.
1910a.

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Dunlavy, J. C. 1935; Hingston, R. W.
1926; Krohn, H. 1916; Thiem, F. M.
1906; Thorpe, W. H. 1926; Zimmer-
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Vidal, G. W. 1879.

Relations between distribution and
geologic formation. Schuster, L. 1909.

Rivers. Distant, W. L. 1904.

Temperature. Bowen, W. W. 1933.
Diomedea exulans. Horton-Smith, C.
1923.

Wind need. *Diomedea exulans*. Hor-
ton-Smith, C. 1923.

WINTER DISTRIBUTION

European birds. Steinbacher, F.
1927. Anserinae. McAtee, W. L.
1911j. *Turdus m. migratorius*. Lewis,
H. F. 1919.

Ability to spend winter in far north.
Migratory birds. Gloger, C. W. 1860e.

Unusual abundance in winter. *Nyc-
tea nyctea*. Deane, R. 1902.

ZOOGEOGRAPHICAL AREAS

General. Sharpe, R. B. 1893.

Avifaunal regions in Africa. Chapin,
J. P. 1923.

Europe. Denmark. Skovgaard, P.
1933c.

Life areas in China. Wilder, G. D.
1930.

Palaearctic region. Sushkin, P. P.
1925b. Book. Text in German. Sie-
vertsov, N. A. 1921.

Southern Arizona. Swarth, H. S.
1929.

Vertical life zones

Hummingbirds at high altitude.
Volcano of Orizaba. Schiede, C. J. &
Deppe, F. 1830.

Includes birds. Thiem, F. M. 1906.

EAR

For function of the cochlea, see under
Hearing.

Books. Text in English. Owen, R.
1866-68.

Text in German. Many species. Gadow, H. F. 1891d; *Retzius, G. 1881-84. *Columba*. Krause, R. 1922.

General. Coues, E. B. 1883; Mojon, B. 1834; Pettigrew, T. J. 1812; Retzius, G. 1880; Vogt, C. C. & Yung, E. 1888-94. Many species. Buchanan, T. 1828; Parker, W. K. 1875, 1877, 1878, 1885. Include birds. Peters, W. K. 1867a, b, 1874. *Anser*. Breschet, G. 1833. *Cariama*. Gray, A. A. 1906. Includes *Falco*. Breschet, G. 1833. *Gallus*. Clayton, J. 1694; Warbrick, J. C. 1912. *Struthio*. Gray, A. A. 1906. *Tetrao urogallus*. Graff, L. 1885.

Good popular description of the ear of birds. Hennicke, C. R. 1889a.

Homology with branchial cleft region in fishes. Includes *Gallus*. Baraldi, G. 1877.

Anatomy

Books. Text in German. Psittacidae. Denker, A. 1907.

Text in Latin. Includes birds. Pohl, C. E. 1818.

General. Beyer, H. 1907; *Breschet, G. 1836. *Anas*. Vicq d'Azyr, F. 1781. *Anser*. Gelle, M. E. 1878. *Columba*. Vicq d'Azyr, F. 1781. *Corvus*. Ercolani, G. B. 1843. *Garrulus* & *Picidae*. Vicq d'Azyr, F. 1781. Psittacidae. Denker, A. 1906b. *Serinus* & *Strigidae*. Vicq d'Azyr, F. 1781. *Strix*. Ercolani, G. B. 1843.

Innervation of ear. Hasse, C. 1867d. *Anser*. Hasse, C. 1873c. *Gallus*. Federici, F. 1926; Hasse, C. 1873c.

Lymph nodes of ear. *Meleagris* & *Tetrao u. urogallus*. Plate, L. H. 1918.

Position in skull. Baur, G. H. 1889; Mojon, B. 1834. *Grandala coelicolor*. Pycraft, W. P. 1927. *Haematopus*, *Lomvia*, *Scolopax*, & *Sula*. Pycraft, W. P. 1908c. Good figures of dissection. *Buteo*. Mouquet, A. & Girard 1924.

Sound-conduction apparatus. Includes birds. Stummer v. Traunfels, R. 1910. *Gallus*. Pohlman, A. G. 1921b.

Development

General. Include birds. Ayers, H. 1892; Huschke, E. 1831. Includes *Anser*. Poli, C. 1897. *Caprimulgus*. Parker, W. K. 1879b. *Gallus*. Kashchenko, N. F. 1887; Mall, F. P. 1888a;

Moldenhauer, W. 1877; Parker, W. K. 1879b; Reagan, F. P. 1915a; *Röthig, P. & Brugsch, T. 1902; Urbantschitsch, V. 1877. Includes *Gallus*. Poli, C. 1897. *Gyps*, *Linota*, & *Scythrops*. Parker, W. K. 1879c. *Serinus*. *Ruhwandl, G. 1916. *Troglodytes*. Parker, W. K. 1879c.

Muscles

Book. Text in German. Gadow, H. F. 1891d.

General. Birds incidental. Killian, G. 1889. *Columba*. Breuer, J. 1907.

Muscle of Breschet. *Anas*, *Anser*, *Columba*, *Gallus*, & *Meleagris*. Pohlman, A. G. 1916.

M. tympani, action. Wada, Y. 1924.

Physiology

Book. Text in German. Psittacidae. *Denker, A. 1907.

General. Breschet, G. 1836. Includes birds. Beyer, H. 1907. Includes *Anser*. Gellé, M. E. 1878. *Gallus*. *Goebel, O. 1913.

Comparative physiology. *Anas*, *Anser*, *Columba*, *Gallus*, *Passer*, & *Serinus*. Wada, Y. 1924.

Experimental lesions, effects. Includes *Columba*. Garnalt, P. 1896.

Injury to ear by acute stimuli and detonation. *Anas*, *Columba*, *Gallus*, *Psittacus*, & *Sturnus*. *Satoh, N. 1917.

EXTERNAL EAR

General. Ercolani, G. B. 1875. Birds incidental. Schwalbe, G. A. 1891a. *Anas*, *Anser*, *Gallus*, & *Meleagris*. Freund, L. 1926b. *Striges*. Beneden, P. J. 1843. *Strigidae*. Kaup, J. J. 1862; Pycraft, W. P. 1898a.

Development

General. *Columba*. Moldenhauer, W. 1877.

External auditory meatus

General. *Strigidae*. Shufeldt, R. W. 1900c.

Development. *Gallus*. Mall, F. P. 1888a.

Fold or papilla in upper wall, which contains a tissue that swells during vocalization and along with pressure from the M. depressor mandibulae occludes the passage, causing temporary deaf-

ness. Male *Tetrao urogallus*. Graff, L. 1885; Wurm, W. 1885.

Glands. Di Colo, F. 1908, 1909. *Gallus* & *Tetrao*. *Schwalbe, G. A. 1890.

MIDDLE EAR

General. Smith, G. 1904. Includes birds. Gaupp, E. W. 1899. Birds incidental. Gaupp, E. W. 1913. *Anas*. Goodrich, E. S. 1915. Includes *Gallus*. Goodrich, E. S. 1915.

Adaptation of middle ear to barometric fluctuations. Includes birds. Pohlman, A. G. 1919a.

Development. *Columba*. Moldenhauer, W. 1877. *Gallus*. Mall, F. P. 1888a; Moldenhauer, W. 1877.

Protective adjustments in middle ear. Function of elastic ligaments. Pohlman, A. G. 1921b.

Removal of middle ear. *Columba*. Jellinek, A. 1926.

Anatomy

General. Includes birds. Beyer, H. 1908.

Elastic ligaments. *Gallus*. *Pohlman, A. G. 1915, 1921b. Psittaci. Pohlman, A. G. 1915.

Homologies of middle ear with reptiles. Dombrowsky, B. 1925.

COLUMELLA

Book. Text in German. Many species. Krause, G. A. 1901.

General. Smith, G. 1904. Include birds. Klaauw, C. J. 1924; Peters, W. K. 1869, 1870. *Rhea* & *Struthio*. Gadow, H. 1889a.

Homology with ear bones of mammals. Includes birds. Huxley, T. H. 1869.

EUSTACHIAN (AUDITORY) TUBE

General. Moulen, A. 1694.

Development. *Gallus*. Mall, F. P. 1888a.

PARATYMPANIC ORGAN OF VITALI

General. Oldenstam, R. A. 1925. Many species. *Vitali, G. 1911a, b, 1911-12, 1914, 1921. Birds incidental. Vitali, G. 1920. *Columba* & *Melospittacus*. Benjamins, C. E. 1926a.

Innervation. *Gallus*. *Benjamins, C. E. 1925; Federici, F. 1927.

Relation to flight. *Columba*. Benjamins, C. E. 1926b; Vitali, G. 1927.

TYMPANIC CAVITY

General. Ercolani, G. B. 1875. Many species. Platner, F. 1839.

Development. *Gallus*. Rauber, A. A. & Moldenhauer, W. 1878.

TYMPANUM

Action of tympanum. Includes birds. Wada, Y. 1924.

Development. *Gallus*. Mall, F. P. 1888a.

Histology. Includes birds. Moldenhauer, W. 1878.

Innervation. Kaji, H. 1926.

INTERNAL EAR

Lymph. Includes *Gallus*. Matsumoto, W. 1924.

Lymphatics. Birds incidental. Hasse, C. 1873a.

Labyrinth

General. Rohrer, F. 1889. Many species. Watt, H. J. 1924. Includes birds. Kuhn, A. 1885. *Anser* & *Gallus*. *Hasse, C. 1873c; *Meitzner, M. 1908.

Absence of labyrinth on one side. *Columba*. Munk, H. 1878.

Anatomy

Book. Text in Danish. *Haliaeetus*. Ibsen, I. P. 1881.

General. *Gray, A. A. 1908a, b. Includes birds. Many species. *Gray, A. A. 1908b. *Anser* & *Columba*. *Hasse, C. 1867c. *Dromaeus* [*Dromiceius*]. Gray, A. A. 1908a. *Gallus*. *Hasse, C. 1867c; Reissner, E. 1851. *Rhea* & *Spheniscus*. Gray, A. A. 1908a. *Struthio*. Chistiakov, N. J. 1904.

Blood supply. *Anas*, *Anser*, *Columba*, & *Gallus*. Snapp, C. F. 1924.

Dissection of skull showing labyrinth in position. Vicq d'Azyr, F. 1776-78, 1781.

Histology. Hazama, —. 1928. Book. Text in German. *Satoh, N. 1917. *Anser*, *Columba*, & *Gallus*. *Hasse, C. 1867c.

Development

General. *Gallus*. Arai, N. 1927; *Röthig, P. & Brugsch, T. 1902.

Early development. Includes *Gallus*. Reichert, C. B. 1837.

Physiology

General. *Columba*. *Matte, F. W. 1894.

Extirpation effects

General. *Columba*. *Matte, F. W. 1894; Trendelenburg, W. 1906b; Wundt, W. M. 1894.

Behavior. *Columba*. Nishihata, T. 1927c.

Hearing effects. Bernstein, J. 1895. *Columba* & *Gallus*. Ewald, J. R. 1895.

Methods of destruction. Nishihata, T. 1927b.

BONY LABYRINTH

General. *Gallus*. Turkewitsch, B. G. 1935. *Pandion*. Shufeldt, R. W. 1891d. *Pterocles*. Turkewitsch, B. G. 1935.

Development. Many species. *Parker, W. K. 1879b.

Skull bones involved. Geoffroy St. Hilaire, E. 1820a.

Useful figures of skull dissected to show bony labyrinth. Book. Text in English. *Meleagris*. Ferrier, D. 1886.

MEMBRANOUS LABYRINTH

General. Includes *Anas* & *Columba*. *Meyer, P. 1876.

Comparative morphology. Includes *Gallus*. *Hasse, C. 1873b.

Distribution of N. facialis. *Ardea*, *Corvus*, *Otus*, & *Strix*. Treviranus, G. R. 1833.

Fenestra rotunda and membrana tympanica secundaria. Book. Text in Latin. Includes birds. Scarpa, A. 1772.

Histology. *Anas* & *Columba*. *Meyer, P. 1876. Includes *Gallus*. *Hasse, C. 1873b.

Innervation by N. acusticus. *Anser*, *Columba*, & *Gallus*. *Hasse, C. 1867c.

Development

General. Birds incidental. Rüdinger, N. 1888. *Gallus*. Gray, H. 1850; Hasse, C. 1867a. *Vanellus*. *Fuchs, F. 1923.

Histogenesis. *Gallus*. *Amerlinck, A. 1930.

Otoconia. Includes *Falco*. Breschet, G. 1833.

Ductus and saccus endolymphaticus

General. *Columba*. Portmann, G. 1920.

Saccus endolymphaticus. *Anas*, *Anser*, *Columba*, *Gallus*, & *Meleagris*. Sterzi, G. 1909.

Ductus endolymphaticus

General. *Anas* & *Gallus*. Fineman, G. 1915; Keibel, F. 1899.

Development. Birds incidental. Keibel, F. 1916. Book. Text in German. *Gallus*. Krause, R. 1901; Keibel, F. 1899.

Lagena (Cochlea)

General. *Hasse, C. 1867b; Huschke, E. 1835. Includes birds. Pritchard, U. 1881; Watt, H. J. 1917. *Anser*. Hasse, C. 1867c. *Columba*. *Breuer, J. 1907; Hasse, C. 1867b, e. *Corvus*, *Gallus* & *Passer*. Hasse, C. 1867e. *Spinus*. *Breuer, J. 1907.

Development. Includes *Columba* & *Gallus*. Held, H. 1909b.

Homology. *Gallus*. Federici, F. 1926.

ANATOMY

General. *Deiters, O. 1860. *Anser* & *Ardea*. Treviranus, G. R. 1825. *Columba*. Amerlinck, A. 1923. *Corvus*, *Falco*, *Fringilla*, *Gallus*, & *Loxia*. Treviranus, G. R. 1825.

Histology. *Columba*. Romieu, M. 1923.

Tegmentum vasculosum. Innervation. *Columba*. Kolmer, W. A. 1928.

PHYSIOLOGY

General. *Columba*. Amerlinck, A. 1923; Romieu, M. 1923.

Sound reception. *Columba*. Tjurnjanzeff, N. F. 1931.

SPIRAL ORGAN (ORGAN OF CORTI)

Basilar membrane. *Psittacus*. Denker, A. 1906a.

Spiral ganglion. *Gallus*. Ramón y Cajal, S. 1908b, f.

Vestibular (semicircular canal) apparatus

General. Many species. *Bartels, M. 1925; *Hopkins, M. A. 1906. Birds incidental. Buchanan, T. 1825. *Anas*. Dubois, R. 1915; Wulf, B. 1901. *Anser*.

*Hasse, C. 1867c. *Columba*. *Bornhardt, A. 1876; *Breuer, J. 1903; Dubois, R. 1915; *Hasse, C. 1867c; Wulf, B. 1901. *Gallus*. *Hasse, C. 1867c; Wulf, B. 1901. *Spinus*. *Breuer, J. 1903.

Ampullae of the semicircular canals. Pritchard, U. 1914.

Aqueductus ampullae posterioris. First description. Canal in surrounding bone connecting ampulla of posterior semicircular canal with recessus perilymphaticus. Gray, A. A. 1926.

Artillery fire effects. *Columba*. Senn, E. 1920.

Endings of vestibular nerves in maculae and cristae acusticae. Includes *Gallus*. Retzius, G. 1905.

Extra maculae. Pritchard, U. 1914.

Neuroepithelium of crista acustica in ampullae. Ebner, B. 1873a, b.

Otoconia. Crystals of lime. Breschet, G. 1833; Huschke, E. 1831, 1832a. *Gallus*. Meitzner, M. 1908.

Otoliths. *Psittacus*. Denker, A. 1906a.

Vestibular ganglion. Ramón y Cajal, S. 1908f.

Physiology, including experimental studies

Books. Text in German. Cyon, E. 1908. Includes *Columba*. *Ewald, J. R. 1892.

General. *Anas* & *Anser*. Schklarewski, A. 1872a. *Columba*. Benjamins, C. E. & Huizinga, E. 1927; Boutan, L. 1902a, b; Cyon, E. 1878, 1900a; Deganello, U. 1899, 1900; Schklarewski, A. 1872a; Stefani, A. 1902-03, 1920; Wegener, H. 1905. (Tumbler pigeon.) Rawitz, B. 1903. *Gallus*. Schklarewski, A. 1872a.

Anesthesia, effects. Review of literature. Includes birds. Gaglio, G. 1899.

"Dancing" due to degeneration. *Anas*. Kolmer, W. A. 1911.

Electric stimulation. *Columba*. Laulanié, B. P. 1888a.

Movements of perilymph. *Columba*. Ewald, J. R. 1889.

Operations and electrical stimulation. *Gröbbels, F. 1926b, 1927a, b, c, d, e.

Orientation. Includes birds. Viguié, C. 1882.

Relation of development to appearance of coordination. Laudenbach, J. P. 1901.

Temperature stimuli, effects on ampullae. *Columba*. Popp, H. 1913.

Experimental lesions

General. Kolmar, W. 1911; *Soprana, F. 1906. *Buteo*. Mouquet, A. & Girard, —. 1924. *Columba*. Czermak, J. N. 1867; Flourens, M. J. 1828a, b, 1830.

Lesion effects on cerebellum. *Columba*. Stefani, — & Weiss, —. 1877.

Extirpation effects on

General. *Gallus*. Kleitman, N. & Koppányi, T. 1926.

Brain. Gröbbels, F. 1927c. Brain tracts. *Columba*. Deganello, U. 1905; Malesani, A. 1909; *Soprana, F. 1906.

Central nervous system. *Columba*. Soprana, F. 1905.

Reflexes. Gröbbels, F. 1922c.

Muscle system

General. *Columba*. *Soprana, F. 1905.

M. pectoralis fibers. *Columba*. Soprana, F. 1907.

Nystagmus

Book. Text in German. Ewald, J. R. 1908.

General. *Columba*. Benjamins, C. E. & Huizinga, E. 1927. Includes *Columba*. Ivy, A. C. 1919. *Gallus*. Kleitman, N. & Koppányi, T. 1926.

Nystagmus following thermal stimulation of N. acusticus. Includes *Columba*. Kubo, I. 1906.

ECOLOGY

See also under **Adaptation, Behavior, Coloration, Distribution, Fauna, Habits, Parasitology, Population and Social relations** for publications which may have material of interest to ecologists.

Books. Text in Danish. *Ciconia*. Skovgaard, P. 1920b.

Text in English. Alexander, W. B. 1928; Allee, W. C. 1931, 1934; Allee, W. C. & Allee, M. H. 1925; Allen, G. M. 1925; Bannerman, D. A. 1930-36; Bryan, W. A. 1915; Hachisuka, M. 1931; Harvie-Brown, J. A. & Buckley, T. E. 1895; *Herrick, F. H. 1935; *Howard, H. E. 1920; Howell, A. H. 1932; Levick, G. M. 1914; McGregor, R. C. & Worcester, D. C.

1906; McNair, J. B. 1923; Meinertzhagen, R. 1930; Murphy, R. C. 1936; Pearson, H. J. 1904; Ralfe, P. G. 1905; Rusby, H. H. 1933; Shelford, V. E. 1929; Shelford, V. E., Dice, L. R., Jones, L., & others 1926; Townsend, C. W. 1912b; Wallace, A. R. 1880; Wheelock, I. G. 1904; Whitaker, J. I. 1905. *Colinus virginianus*. Stoddard, H. L. 1925b, 1931. *Sturnus*. Bready, M. B. 1929. *Tympanuchus c. cupido*. Gross, A. O. 1930.

Text in French. Espinas, A. V. 1878; Girod, P. 1891.

Text in German. Deegener, P. 1918; Gloger, C. W. 1833; Hantzsch, B. 1905; Kobelt, W. 1902; Laubmann, H. 1931; Rensch, B. 1930; Sievertsov, N. A. 1921.

General and with variable ecological significance. Adams, C. C. 1915; Alexander, H. G. 1915a; Allee, W. C. 1923; Bagg, A. C. 1923; Boulton, W. R. 1926b; Braun, F. 1900a; Brehm, C. L. 1831a; Breninger, G. F. 1905; Dury, C. 1910a; Eigenmann, C. H. 1918; Gloger, C. W. 1857; Grinnell, J. 1924a, b, c, 1925b; Grinnell, J. & Wythe, M. W. 1927; Hobson, A. D. & Matthews, L. H. 1923; Hornaday, W. T. 1898; Jones, L. 1893b; Lorenz, K. 1935; Loyd, L. R. 1924; Meinertzhagen, R. 1920a, b; Oustalet, J. F. 1892; Rowan, W. 1922a; Sievertsov, N. A. 1921; Sushkin, P. P. 1900a; Vaughan, J. H. 1929.

Game birds. Grinnell, J. 1927a. Palearctic birds. Banks, E. 1925. Waterfowl. Eigenmann, C. H. 1918; Hildebrandt, H. 1926; Lincoln, F. C. 1925a. Book. Text in English. Phillips, J. C. & Lincoln, F. C. 1930.

Acrocephalus palustris. Kayser, C. 1926; Zimmerman, R. 1927. *Agelaius p. phoeniceus*. Allen, A. A. 1914b. *Aix sponsa*. Fisher, A. K. 1902. *Alauda*. Cerva, F. 1920. *Amazilia t. tzacatl*. Skutch, A. F. 1931. *Anatidae*. *Heinroth, O. 1912a. *Aramus p. pictus*. Nicholson, D. J. 1928. *Ardeidae*. Praeger, W. E. 1920. *Asio*. Goddard, T. R. 1935. *Bubo v. virginianus*. Gardner, L. L. 1929. *Campephilus principalis*. Kennard, F. H. 1915b. *Catoprophorus s. semipalmatus*. Vogt, W. 1938. *Certhia familiaris americana*. Tyler, W. M. 1914. *Ceryle alcyon*. Milne-Edwards, A. 1896b. *Ciconia c. ciconia*. Schenk, J. 1908a. *Cinnyris*. Evans, M. S. 1895b. *Clangula c. americana*. Brewster, W. 1900. *Colinus*

virginianus. Kendeigh, S. C. 1933. *Columba*. Masure, R. H. & Allee, W. C. 1934. *Columbidae*. Gates, W. H. 1909. *Corvidae*. Lorenz, K. 1931. *Corvus b. brachyrhynchus*. Brooks, A. 1925a; Childs, J. L. 1916. *Corvus corone*. Meise, W. 1928. *Corvus f. frugilegus*. Csörgey, T. 1926b. *Cuculi*. Baker, E. C. 1922a. *Cygnus*. Christoleit, E. 1926a. *Dendroica kirtlandi*. Leopold, N. F. 1924. *Diomedea exulans*. Horton-Smith, C. 1923. *Diomedidae*. Barrett-Hamilton, G. E. 1903b. *Drepanididae*. Perkins, R. C. 1901. *Dumetella*. Gill, G. 1935. *Gallus*. Caton, J. D. 1881; Masure, R. H. & Allee, W. C. 1934. *Geothlypis*. Palmer, W. 1900. *Gypaetus barbatus*. Kammer, A. 1922-24. *Haematopus*. Dewar, J. M. 1915a. *Helminthophila ruficapilla gutturalis*. Osgood, W. H. 1896. *Hesperiphona v. vespertina*. Ligon, J. S. 1923. *Lagopus*. Dyrdowska, M. 1923. *Lanius*. Miller, A. H. 1931. *Leucosticte t. tephrocotis*. Ray, M. S. 1910. *Lophortyx*. Gorsuch, D. 1934. *Lophortyx c. californica*. Sumner, E. L. 1935. *Loxia*. Cavazza, F. 1909. *Meleagris*. Caton, J. D. 1881. *Melospiza melodia*. Nice, M. M. 1933b, 1934a. *Mergus*. Cerva, F. 1920. *Mimus*. Michener, H. & Michener, J. R. 1935. *Mimus p. polyglottos*. Lockwood, S. 1892. *Nycticorax*. Bailey, S. W. 1915. *Opisthocornus*. Beebe, C. W. 1909a, 1911. *Oreophasis derbianus*. Blake, E. R. 1936b. *Parus atricapillus*. Palmgren, P. 1932. *Parus cristatus*. Palmgren, P. 1927. *Passer*. Grinnell, J. 1919; Zipperlen, A. 1880. *Passerella iliaca*. Linsdale, J. M. 1928c. *Passerherbulus caudatus*. Peabody, P. B. 1901. *Pedioecetes*. Snyder, L. L. 1935b. *Pedioecetes phasianellus campestris*. Johnson, C. E. 1934. *Perdix perdix*. Oldys, H. W. 1910a. *Phaethon*. Gross, A. O. 1912. *Phaethornis*. Davis, T. A. 1934. *Phalacrocorax a. auritus*. Lewis, H. F. 1931. *Phasianioidea*. Judd, S. D. 1905b. *Philohela minor*. Fisher, A. K. 1902. *Phylloscopus*. Brock, S. E. 1910b. *Picidae*. Burt, W. H. 1930. *Podiceps s. cristatus*. Venable, L. S. & Lack, D. 1934. *Progne*. Jacobs, J. W. 1903, 1904, 1909. *Protonotaria citrea*. Roberts, T. S. 1899. *Puffinus*. Anthony, A. W. 1900. *Pygornis*. Davis, T. A. 1934. *Regulus*. Palmgren, P. 1932. *Selasphorus rufus*. Kobbé, W. H. 1900b. *Serinus*. Bolle, C. 1858; Mayr, E. 1926; Schenk, J. 1925a. *Speotyto cunicularia hypogaea*. Abbott, C. G. 1930. *Speotyto floridana*.

Palmer, W. 1896a. Spheniscidae. Bikkéssy, G. 1891; Lowe, P. R. 1933a. *Spiza*. Gross, A. O. 1921. *Stellula calliope*. Weydemeyer, W. 1927. *Sterna paradisaea* & *Sterna s. sandvicensis*. Dirksen, R. 1932. *Struthio*. Aplin, O. V. 1894c; Duerden, J. E. 1909c. *Sturnus*. Bissonnette, T. H. & Chapnick, M. H. 1930; Brubaker, J. H. 1927; Cooke, M. T. 1925. *Sula [Moris] bassana*. Wynne-Edwards, V. C. 1935a. *Sylvia u. undata*. Venables, L. S. 1934. *Topaza pella*. Nicholson, E. M. 1931b. Trochilidae. Woods, R. S. 1927; Anon. 1897a. *Troglodytes a. aëdon*. Baldwin, S. P. & Bowen, W. W. 1928; Brooks, A. 1925c, 1926b; Creaser, C. W. 1925. *Tympanuchus cupido americana*. Johnson, C. E. 1934. *Urinator arcticus*. Zedlitz, O. 1913. *Zenaidura*. Cole, L. J. 1933. *Zonotrichia querula*. Semple, J. B. & Sutton, G. M. 1932.

Balance of nature. Turrel, —. 1874.

Breeding relations. *Phylloscopus*. Brock, S. E. 1910b.

Reversion to wild state of domestic animals. Includes *Gallus* & *Meleagris*. Caton, J. D. 1881.

Significance of ecology. Heyder, R. 1926.

Zonal and ecological areas. Sharpe, R. B. 1893. Book. Text in German. Kobelt, W. 1902. Japan. Kano, T. O. 1932. Mountains of Latium, Italy. Alexander, C. J. 1917a.

PUBLICATIONS CLASSIFIED GEOGRAPHICALLY WHICH CONTAIN MATERIAL OF POSSIBLE INTEREST TO ECOLOGISTS AND WHICH INVOLVE BIRDS

Africa

General. Bates, G. L. 1931; Bowen, W. W. 1933; Chapin, J. P. 1923; Lönnberg, A. J. 1926a, 1929a.

Belgian Congo. Allen, G. M. 1930; Chapin, J. P. 1932.

Central Africa. Gyldenstolpe, N. C. 1924; Lynes, H. & Lowe, W. P. 1934.

Dutch East Africa. Schuster, L. 1926a.

Egypt. Book. Text in English. Meinertzhagen, R. 1930. Desert. Moreau, R. E. 1928.

Kamerun, southern. Bates, G. L. 1908.

Liberia. Allen, G. M. 1930.

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Mississippi. Tishoming County. Allison, A. 1907.

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Vermont. Howell, A. H. 1901.

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Coast land. Young, C. G. 1928.

Colombia

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Paraguay

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Peru

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Sea coast. Murphy, R. C. 1920, 1923b.

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Asia

General. Weigold, H. 1912a.

China. Mell, R. 1923; Wilder, G. D. 1930.

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Turkey. Mesopotamia (Iraq). Meinertzhagen, R. 1914; Weigold, H. 1912a.

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General. Barnard, H. G. 1927; Severenty, D. L. 1937; White, S. A. 1914.

Europe

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ATLANTIC OCEAN

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Frequency of birds. Relation to quantity of macroplankton. Jespersen, P. 1924, 1925.

Oceanic islands

Malay Archipelago. Island of Timor. Wallace, A. R. 1861.

ISLANDS OF ATLANTIC OCEAN

Bermuda Islands. Gross, A. O. 1912; Shufeldt, R. W. 1916a.

Canary Islands. Bannerman, D. A. 1919, 1922b.

Massachusetts coast vicinity

Muskeget Island. Mackay, G. H. 1895. Plum Island. *Nycticorax*. Bailey, S. W. 1915. Weepeeket Islands. Cahn, A. R. 1916.

South American coast vicinity

Caribbean Sea. Hartert, E. J. 1939b.

West Indies

Culebra Island. Wetmore, A. 1917b. Desecho Island. Wetmore, A. 1918a. Grand Cayman Island. Savage-English, T. M. 1916.

Guadeloupe Island. Noble, G. K. 1916.

Haiti and Dominican Republic. Wetmore, A. & Swales, B. H. 1931.

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Celebes. Wallace, A. R. 1860.

Ceylon. Legge, W. V. 1874.

Cocos Islands. Snodgrass, R. E. & Heller, E. 1902.

Java. Finsch, O. 1906.

ISLANDS OF PACIFIC OCEAN

Clipperton Island. Snodgrass, R. E. & Heller, E. 1902.

Galapagos Islands. Loomis, L. M. 1918; Ridgway, R. 1897.

Guadeloupe Island. Ridgway, R. 1876.

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Laysan Island. Fisher, W. K. 1903b.

New Zealand. Book. Text in English. Stead, E. F. 1932.

Philippine Islands. McGregor, R. C. 1920; Worcester, D. C. & Bourns, F. S. 1898. Books. Text in English. Hachisuka, M. 1931; McGregor, R. C. & Worcester, D. C. 1906. Palawan Islands. Worcester, D. C. & Bourns, F. S. 1898.

Queen Charlotte Islands. Osgood, W. H. 1901.

South Pacific islands. Ball, S. C. 1933.

Polar regions

ANTARCTIC OCEAN

General. Murphy, R. C. 1928.

South Orkney Islands. Clarke, W. E. 1905b.

Weddell Sea. Clarke, W. E. 1905b.

PALEARCTIC REGION

General. Banks, E. 1925.

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Greenland. Helms, O. 1926; Schaanning, H. T. 1933b.

Spitzbergen. Birula, A. 1910; Summerhayes, V. S. & Elton, C. S. 1923, 1928.

ASSOCIATIONS

Birds associated with various topographic or physical areas, and their significance.

General. Brock, S. E. 1921; Saunders, A. A. 1914. *Toxostoma*. Grinnell, J. 1917b.

Aspen Parkland. Canada. Bird, R. D. 1930.

Bogs in Wisconsin. Includes birds. Andrews, O. V. 1915.

Burnt barrens. Pennsylvania. Weygandt, C. 1911.

"Bush" land. New Zealand. McLean, J. C. 1907.

Caves. Bermuda Islands. Shufeldt, R. W. 1916a.

Danish heather plantations. Skovgaard, P. 1925c.

Gran Chaco region. Book. Text in German. Laubmann, H. 1931.

Grassland. Africa. *Chapin, J. P. 1923. Dakota. Bailey, F. A. 1915.

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Ingression. Jackson, H. H. 1914.

Irrigated ranch. Bailey, F. A. 1910a.

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River overflow region. Brown, R. A. 1906.

Succession of bird associations. *Adams, C. C. 1908a, b, 1909.

Coasts and shores

General. Nichols, J. T. 1931.

New Jersey. Stone, W. 1926.

Peru. Murphy, R. C. 1920, 1923b.

Point Pelee, Canada. Taverner, P. A. & Swales, B. H. 1908.

South Carolina. Sprunt, A. 1925.

Deserts

California. Howell, A. B. 1923.

Central Sahara. Hartert, E. J. 1921.

Death Valley, California. Fisher, A. K. 1893c; Grinnell, J. 1919, 1923, 1934.

Egypt. Moreau, R. E. 1928.

North America. Oberholser, H. C. 1921.

Forest regions

General. Hankinson, T. L. 1915; McAtee, W. L. 1926d.

Beech forest. Sedlacek, W. 1915.

Forest margin. Carpenter, J. R. 1935.

Tropical rain forest. *Chapin, J. P. 1923. Book. Text in English. Allee, W. C. & Allee, M. H. 1925.

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ATLANTIC OCEAN

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1919, 1922b. Culebra Island (near Porto Rico). Wetmore, A. 1917b. Desecho Island. Wetmore, A. 1918a. French West Indies. Noble, G. K. 1916. Grand Cayman Island. Savage-English, T. M. 1916. Guadeloupe Island. Noble, G. K. 1916. Haiti and Dominican Republic. Wetmore, A. & Swales, B. H. 1931. Iceland. Hantzsch, B. 1905. Isle of Man. Book. Text in English. Ralfe, P. G. 1905. Muskeget Island, Massachusetts. Mackay, G. H. 1895. Plum Island, Massachusetts. Bailey, S. W. 1915. Porto Rico. Wetmore, A. 1917b, 1918a. Trinidad Islet, Brazil. Murphy, R. C. 1915a. Weepocket Islands. Cahn, A. R. 1916. West Indies. Savage-English, T. M. 1916.

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Aruba, Bonaire, Curaçao. Hartert, E. J. 1893b.

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Alkaline lake, New Mexico. Bailey, F. A. 1910b.

Dakota lake borders. Bailey, F. A. 1915.

Finger Lakes region, New York. Spiker, C. J. 1935.

Great Salt Lake, Utah. Wetmore, A. 1917d.

Lake Crescent region, Washington. Rathbun, S. F. 1916.

Lake region, Cheboygan County, Michigan. Wood, N. A. 1916.

Oneida Lake region, New York. Stoner, D. 1932.

GREAT LAKES

Lake Erie. Todd, W. E. 1904.

Lake Michigan. Wood, N. A. 1916.

ISLANDS OF GREAT LAKES

Isle Royale, Michigan. McCreary, O. 1909.

Mackinac Island, Michigan. White, S. E. 1893.

Presque Isle, Lake Erie. Todd, W. E. 1904.

Marshes and sloughs

General. Bailey, F. A. 1915; Kennard, F. H. 1915a.

Cattail marsh. *Agelaius*. *Allen, A. A. 1914b.

New Jersey marshes. Abbott, C. G. 1907.

New York marshes. Saunders, A. A. 1926.

Salt marshes, Massachusetts. Book. Text in English. Townsend, C. W. 1912b.

Skokie marsh area, Illinois. Baker, F. C. 1910.

Mountains

General. McCreary, O. 1906; Ruthven, A. G. 1906.

Andes. Book. Text in English. Rusby, H. H. 1933.

Latium, Italy. Alexander, C. J. 1917a.

Lassen Peak, California. Grinnell, J., Dixon, J. S., & Linsdale, J. M. 1930.

Mount Shasta, California. Merriam, C. H. 1899.

Pyramid Peak, California. Ray, M. S. 1910.

San Bernardino Mountains. Grinnell, J. 1908a.

Virginia, Mountain County. Murray, J. J. 1935.

Hummingbird at great height on mountain. Schiede, C. J. & Deppe, F. 1830.

Oceans

Books. Text in English. Alexander, W. B. 1928; Murphy, R. C. 1936.

General. Grinnell, J. 1920a; Pässler, R. 1913; Tschudi, J. J. 1856.

Antarctic Ocean. Murphy, R. C. 1928a. Weddell Sea. Clarke, W. E. 1905b.

North Atlantic Ocean. *Hagerup, O. 1926; Jespersen, P. 1924, 1925; Wynne-Edwards, V. C. 1935b.

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Pacific Ocean. Snodgrass, R. E. & Heller, E. 1902.

Ponds

General. Spiker, C. J. 1931.

Solution pond. Scott, W. 1911.

Prairies

Cultivated prairie. Intensive study of square mile. Abel, A. R. 1921.

Dakota. Bailey, F. A. 1915.

Illinois. Gross, A. O. 1921; Hankinson, T. L. 1915, 1916.

Sand prairie of Illinois. Vestal, A. G. 1913.

Sand regions

Beach. *Charadrius melodus*. Robbins, C. A. 1919.

Dunes. Massachusetts. Book. Text in English. Townsend, C. W. 1912b. Michigan. Wood, N. A. 1916. Saginaw Bay, Michigan. Wood, N. A. & Gage, F. M. 1911.

Hills. Nebraska. Oberholser, H. C. & McAtee, W. L. 1920.

Swamps

General. Gabrielson, I. N. 1914b; Netting, M. G. & Van Dersal, W. R. 1934; Spiker, C. J. 1931.

Okefinokee Swamp. Wright, A. H. & Harper, F. 1913.

Tropical jungles

Book. Text in English. Rusby, H. H. 1933.

General. British Guiana, South America. *Beebe, C. W. 1925a; Beebe, C. W., Hartley, G. I., and others 1917.

Tropical Africa. Chapin, J. P. 1923.

Eurasian tundra. Siberia, Asia. Pleske, T. D. 1928.

Valleys

Lower Colorado River Valley. Grinnell, J. 1914a.

Willow Creek Valley, Oregon. Peck, M. E. 1911b.

Yakima Valley, Washington. Kennedy, C. H. 1914.

CIVILIZATION EFFECTS

General. Braun, F. 1913b; Gibbs, R. M. 1892d; Schuster, W. 1903b.

Habits. Fowler, S. P. 1860; Pitman, C. R. 1922.

CLIMATE AND WEATHER

Ability of migratory birds to spend winter in far north. Gloger, C. W. 1860e.

Acclimatization. Many species. Wolda, G. 1923. *Struthio*. Duerden, J. E. 1909c.

Climatic changes in Africa. Lönnberg, A. J. 1926a, 1929a.

Declimatization. Many species. Wolda, G. 1923.

Relation to altitude. Burg, G. 1926.

Wild goose as weather prophet. Buxbaum, L. 1891.

Effects of climate and weather

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Breeding. Bau, A. 1910.

Color and size. Grinnell, J. 1910.

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Growth rate. Gloger, C. W. 1860c. Singing. Better singing in far north. Gloger, C. W. 1859a.

Storms. Include birds. Faye, H. 1896; Gray, R. 1881, 1885.

Winter weather. Hicks, L. E. 1932c, e; Jourdain, F. C. & Witherby, H. F. 1918.

RAINFALL EFFECTS

General. Hume, A. O. 1878b. African birds. Bowen, W. W. 1933.

Distribution. Migratory waders and water birds. Vidal, G. W. 1879.

Effects of temperature

Distribution. African birds. Bowen, W. W. 1933. *Diomedea exulans*. Horton-Smith, C. 1923.

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General. Baxter, E. V. & Rintoul, L. J. 1926. Exotic birds. Babault, G. 1918.

Ability of tropical birds to stand cold. Hessler, A. 1854b.

Extreme cold. Carroll, C. J. 1917; Rowan, W. 1927b.

Freezing of lake. Cahn, A. R. 1912.

COMMENSALISM

Eggs of two species in same nest. *Phasianus* & *Perdix*. Mawson, G. 1865.

Joint use of nest by two species. *Mergus serrator* & *Tadorna serrator*. Zedlitz, O. 1927b. *Merula merula* & *Tharrhaleus modularis*. Brockholes, W. F. 1900.

Sea birds and fishes. Mutual attraction. Fishes have taste for feathers. Henmi, J. 1927.

Fauna of birds' nests

General. Dobrosky, I. D. 1925. Birds' nests as hibernacula of insects and arachnids. McAtee, W. L. 1927b, c.

COMMUNITIES AND COMMUNAL RELATIONSHIPS

See also under Social relations.

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General. Allee, W. C. 1923, 1934; Forstner, G. G. 1907; Hall, H. M. &

Grinnell, J. 1919; Katz, D. 1926; Knopfi, W. 1914; Sherman, A. R. 1924.

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Aspen parkland. Canada. Includes birds. Bird, R. D. 1930.

Bayou. Peet, M. M. 1908.

Communal relationships for defense. Deschiens, R. 1918.

Experimental colonization. *Progne*. Miller, C. W. 1909.

External parasites in birds' nests. Dobrosky, I. D. 1925.

Family units. *Larus*. Herrick, F. H. 1912.

Farm. Forbush, E. H. 1903, 1908c.

Forty acre tract. Oklahoma. Nice, M. M. 1928.

Gregariousness. *Passer & Psaltriparus*. Miller, R. C. 1921a, b, 1922.

Marsh community. *Agelaius p. phoeniceus*. *Allen, A. A. 1914b.

Ocean community. *Hagerup, O. 1926.

Orchard community. Forbes, S. A. 1921.

Prairie community. Prairie dog, owl and rattlesnake. Williston, S. W. 1878.

Wading bird rookery. Christy, B. H. 1928.

Relations to biota

See also under **Economic ornithology**.

General. Includes birds. Forbes, S. A. 1880d. *Corvus b. brachyrhynchos*. Brooks, A. 1925a. *Troglodytes a. aëdon*. Brooks, A. 1925c; Creaser, C. W. 1925; McAtee, W. L. 1926c.

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Destroying *Colinus*. *Corvus b. brachyrhynchos*. Childs, J. L. 1916.

Food supply influence on time of breeding. Tropical birds. Quelch, J. J. 1898-99b.

Harmfulness in killing insects. McAtee, W. L. 1928b.

Mosquitoes using birds as food. Legendre, J. 1922.

Paper wasps (*Polistes*) as pests in bird houses. McAtee, W. L. 1929c.

Relations of birds and insects. Barber, G. W. 1926; Beal, F. E. 1909.

RELATIONS OF FLOWERS TO BIRDS THAT FREQUENT THEM

General. Loew, E. 1907.

Fertilization of flowers. Everett, A. H. 1877. *Cinnyris*. Evans, M. S. 1895b.

Roosting communities

General. *Corvus b. brachyrhynchos*. Edwards, C. L. 1888. *Quiscalus*. Jones, L. 1897.

Roosts and routes. British Isles. Cummings, B. F. 1908.

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Winter roosts. *Corvus*. Edwards, C. L. 1888; Townsend, C. W. 1918. *Turdus m. migratorius*. Widmann, O. 1895.

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Adaptation of body form to arboreal life. Anthony, R. L. 1912.

Altitude and climate. Burg, G. 1926.

Food supply. Braun, F. 1918a.

Gaseous environment of embryo. Riddle, O. 1924b.

Length of day. Braun, F. 1918b.

Light periodicity. *Zenaidura*. Cole, L. J. 1933.

Limited area in eastern Kansas. Linsdale, J. M. 1928a, 1933.

Molt and color of plumage. *Alauda* & *Mergus*. Cerva, F. 1920.

Relatively safe existence of birds at sea. Grinnell, J. 1920a.

Roadways. Linsdale, J. M. 1929.

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Vegetation

General. Linsdale, J. M. 1928b; Trotter, S. 1912.

Changes in flora. Braun, F. 1904.

HABITATS

General. Brock, S. E. 1914b; Eifrig, C. W. 1929; Errington, P. L. 1933.

Breeding habitats. Burns, F. L. 1924.

Changes in habitat. Loewis, O. 1881a.

Living in culvert drains of city. *Speotyto cunicularia hypogaea*. Abbott, C. G. 1930.

What birds indicate proximity to water and at what distance? Merriam, C. H. 1888.

Land birds at sea

General. Anthony, A. W. 1897a. Compothlypidae. Penard, T. E. 1926.

Capture at great distance from land. *Ceryle alcyon*. Milne-Edwards, A. 1896b. Trochilidae. Anon. 1897a.

INTRODUCTION OF SPECIES TO NEW REGION

See also under **Distribution**.

General. Olds, H. W. 1910a; Wolford, H. L. 1854.

Introduced species in North America. Prout, J. S. 1884. *Passer*. Bergtold, W. H. 1921; Zipperlen, A. 1880. *Perdix perdix*. Olds, H. W. 1910a.

Introduction of birds into Hawaii. Bryan, W. A. 1912. Book. Text in English. Bryan, W. A. 1915.

Effects on biota

General. McAtee, W. L. 1925b, c.

Danger of introducing noxious animals and birds. McAtee, W. L. 1925b.

Acridotheres tristis. Stoner, D. 1923b. Book. Text in English. Palmer, T. S. 1898.

Dissemination of chestnut-blight fungus. McAtee, W. L. 1915c, d.

DISPERSION OF SEEDS OF PLANTS

See also under **Economic Ornithology**.

General. Newton, A. 1864; Woodruffe-Peacock, E. A. 1919.

Acorns. *Corvus*. Reid, C. 1895.

Mistletoe. Book. Text in English. Tubeuf, K. 1923.

Poison ivy. Book. Text in English. McNair, J. B. 1923.

ECONOMIC ORNITHOLOGY

Publications on the economic relations of birds to man. See also under **Diseases**, **Ecology**, and **Poultry culture**.

Books. Text in English. Baynes, E. H. 1915; Caustier, E. 1893; Chapman, F. M. 1912b; Collinge, W. E. 1913b; Forbush, E. H. 1907, 1908a, b, 1912, 1913b, 1925-27; Forbush, E. H. & Fernald, C. H. 1896; Gladstone, H. S. 1919; Gurney, J. H. Jr. 1921; Henderson, J. 1927; Huntington, D. W. 1910; Jennings, J. 1829; Johnston, I. H. 1923; Loyd, L. R. 1924; Nash, C. W. 1904; Turner, L. M. 1886; Warren, B. H. 1888; Watson, J. B. 1893; Weed, C. M. & Dearborn, M. 1903. *Aquila*. Gordon, S. P. 1927. *Colinus*. Stoddard, H. L. 1931. *Molothrus*. Friedmann, H. 1929. *Nestor notabilis*. Marriner, G. R. 1909. *Passer*. Tegetmeier, W. B. 1899a. *Sturnus vulgaris*. Bready, M. B. 1929. *Syrhaptes paradoxus*. Tegetmeier, W. B. 1888.

Text in French. Arenberg, E. 1912; Dubois, A. J. 1893; Farsky, O. 1928; Madon, P. 1933.

Text in German. Bräss, M. 1912b; Floericke, C. E. 1908-13; Mühlig, J. G. 1875; Oertel, M. J. 1883; Schuster, W. 1908b; Tschudi, F. 1858.

Text in Polish. Taczanowski, W. 1860.

Text in Portuguese. Da Costa, J. W. 1914.

General. Boucard, A. 1901; Boulton, W. R. 1926a; Chernel von Chernelhaza, I. 1901a; Collinge, W. E. 1917b; *Csiki,

E. 1904; Curtis, W. P. 1913; Floericke, C. E. 1908-13; Forbush, E. H. 1913a; Hahn, W. L. 1913; Hanff, —. 1911; Hepburn, A. 1843c; Lowe, J. 1896; McAtee, W. L. 1905a, 1909, 1910d, 1911c, 1912c, 1917-18, 1920c, 1924b, 1925a, 1927a, 1932b, c; McAtee, W. L. & Beal, F. E. 1912; *Plačzek, B. 1901; Quinet, A. 1907; Rhoads, S. N. 1898; Shufeldt, R. W. 1893f; Snell, F. H. 1857d; Ternier, L. 1915; Weed, C. M. 1902; Weed, C. M. & Dearborn, M. 1924; Wenninger, F. J. 1909; Anon. 1915b.

Accipitridae. Dixon, J. S. 1922. *Acridotheres tristis*. Stoner, D. 1923b. *Aethiops*. Wood, C. A. 1924c. *Agelaius*. Soriano, P. S. 1931. *Alcedo*. Collinge, W. E. 1921b. *Asio f. flammeus*. Fisher, A. K. 1889c, e. *Astur*. Sutton, G. M. 1927b. *Astur g. gentilis*. Zimmermann, R. 1909. *Bombycilla*. Craig, J. 1896. *Bubo ignavus*. Ržehak, E. C. 1896b. *Buteo buteo*. Barthos, G. 1908. *Carpodacus*. Bergtold, W. H. 1914. *Cephus*. Waterton, C. 1835b. *Ciconia c. ciconia*. Schenk, J. 1908a. *Circus hudsonius*. Fisher, A. K. 1889d. *Colinus*. Judd, S. D. 1904. *Columbidae*. Gates, W. H. 1909; McAtee, W. L. 1910a. *Colymbidae*. Wetmore, A. 1924. *Corvidae*. Froggatt, W. W. 1918. *Corvus*. Collinge, W. E. 1920b; Criddle, N. 1917a; Csörgy, T. 1904; Forbush, E. H. 1896; Hellmann, A. 1855; Jablonowski, J. 1902; Kalmbach, E. R. 1918, 1920; Raspail, X. 1909a; Schleh, E. 1904. *Corvus b. brachyrhynchus*. Edwards, C. L. 1888; Forbush, E. H. 1896. *Corvus corone*. Snell, F. H. 1864. *Corvus f. frugilegus*. Csörgy, T. 1926b; Hauer, B. 1904; McAtee, W. L. 1917b; Soos, L. 1904. *Cuculus*. Bau, A. 1902. *Dolichonyx*. Miller, W. 1886. *Dolichonyx oryzivorus*. McAtee, W. L. 1919c. *Dumetella carolinensis*. Judd, S. D. 1897. *Euphagus cyanocephalus*. Soriano, P. S. 1931. *Falco sparverius*. Fisher, A. K. 1889f. Sherman, A. R. 1913b. *Falcones*. Fisher, A. K. 1888b, 1893a, b, 1907, 1910; McAtee, W. L. 1926b; Oliver, G. 1926; Ragsdale, G. H. 1884; Stone, W. 1930; Taverner, P. A. 1918. Flightless birds. Fitzsimons, F. W. 1907. *Fringilla c. coelebs*. McAtee, W. L. 1917b; Ritzema Bos, J. 1901. *Fringillidae*. Judd, S. D. 1901; McAtee, W. L. 1911e. *Galeoscoptes [Dumetella] carolinensis*. Judd, S. D. 1897. *Gallus*. Raggi, L. 1904. Game birds of U. S. Elliot, D. G. 1865. *Garrulus g. glandarius*. Müller, K. 1890. *Gyps kolbi*. Taylor,

C. H. 1908. *Haliaeetus*. Oberholser, H. C. 1906. *Lophortyx*. Bryant, H. C. 1913b. *Lophortyx c. californica*. Sumner, E. L. Jr. 1935. *Megascops [Otus] asio*. Fisher, A. K. 1889a. *Megascops [Otus] flammeolus*. Fisher, A. K. 1889c. *Meleagris*. Wright, A. H. 1914; Anon. 1832b. *Melopelia asiatica*. Wetmore, A. 1920f. *Molothrus*. Friedmann, H. 1929. *Nestor notabilis*. Marriner, G. R. 1908. *Nyctea nyctea*. Sutton, G. M. 1927b. *Odontophorinae*. Judd, S. D. 1905a. *Otis*. Lafourcade, P. 1890. *Otocoris*. McAtee, W. L. 1905c. *Otus*. Allen, A. A. 1924. *Otus asio kenneicotti*. Munro, J. A. 1925. *Parus*. Cotte, J. 1913. *Passer*. *Barrows, W. B. 1889a; Coues, E. B. 1878b, 1882; Glover, T. 1871; Mather, F. 1880; Schleh, E. 1883; Schneck, S. 1880; Strong, R. M. 1891a; Svetozár, I. 1905; Zipperlen, A. 1880. *Passeres*. Belding, L. 1900; Trillon, J. 1887. *Pelecanus occidentalis*. Bailey, A. M. 1918. *Penthestes a. atricapillus*. Sanderson, E. D. 1898. *Perdix*. Didier, R. 1914. *Perdix perdix*. Lósy, J. 1903. *Pica*. Kalmbach, E. R. 1927. *Picidae*. Felt, E. P. 1926. *Picus martius*. Rendle, M. 1912. *Sialia*. Bryant, H. C. 1915c. *Sitta c. carolinensis*. Sanderson, E. D. 1898. *Somateria*. Townsend, C. W. 1914. *Sphyrapicus v. varius*. Horsford, B. 1884. *Spiza*. Gross, A. O. 1921. *Strigidae*. Dixon, J. S. 1922; Fisher, A. K. 1893b, 1907, 1909, 1910; Oliver, G. 1926; Shufeldt, R. W. 1915h. *Strix*. Altum, B. 1866a. *Strix flammea*. Jäckel, A. J. 1866; Waterton, C. 1832a. *Struthionidae*. Beebe, C. W. 1905a. *Sturnella*. Bryant, H. C. 1913a, 1914c. *Sturnus vulgaris*. Boas, J. E. 1909; Collinge, W. E. 1921c; Froggatt, W. W. 1912; Gabrielson, I. N. & Kalmbach, E. R. 1921; Geyr von Schweppenburg, H. 1904c; Wood, C. A. 1924c; Lewis, H. F. 1927a; McAtee, W. L. 1917b. *Sula*. Gurney, J. H. Jr. 1914a. *Toxostoma rufum*. Gabrielson, I. N. 1913a. *Troglodytes a. aëdon*. Chapman, F. M. 1925a. *Turdus*. Bryant, H. C. 1915c. *Turdus m. migratorius*. Surface, H. A. 1907. *Turdus t. torquatus*. Koepert, O. 1903. *Tyto*. Finlay, W. L. 1906a; White, S. A. 1915; Tyler, J. G. 1915. *Vireo olivaceus*. Stephens, T. C. 1917b. *Zosterops*. Chisholm, A. H. 1908b.

Bird control. McAtee, W. L. 1932e, 1933b.

Detecting poison gas. Book. Text in English. *Serinus*. Gladstone, H. S. 1919.

Fertilization of flowers. Trochilidae. Baird, S. F. 1870; Beal, W. J. 1880.

Game birds as food for man. Henshaw, H. W. 1915.

History of economic ornithology in America. McAtee, W. L. 1933a.

Honey guides in Africa. Chapin, J. P. 1924a.

Hygienic significance of birds. Henricke, C. R. 1917.

Importation of useful birds. Wolford, H. L. 1854.

Methods in economic ornithology. Judd, S. D. 1897.

Observations on objects found in feces. *Corvus*. Loos, C. 1902b.

Pine-seed eating. Osmaston, A. E. 1918.

Remedy for sparrow nuisance. Bathgate, A. 1904.

Risks of introduction of alien game birds. Grinnell, J. 1925b.

Significance of knowledge of feather structure in criminology. Kockel, R. 1909.

ECONOMIC ORNITHOLOGY INVOLVING VARIOUS REGIONS

Africa

General. McAtee, W. L. 1919e; Roberts, A. 1911; Warren, E. 1913.

Asia

India. Selater, W. L. 1892.

Europe

AUSTRIA

General. Talský, J. 1896.

BRITISH ISLES

General. Collinge, W. E. 1927b.

England. Kent. Book. Text in English. Ticehurst, N. F. 1909.

Scotland. Gilmour, J. 1896.

DENMARK

General. Skovgaard, P. 1925c.

FAROE ISLANDS

General. Arenberg, E. & Anthony, R. L. 1913.

FRANCE

General. Cathelin, F. 1919; Hamonville, J. C. 1896, 1897; Lescuyer, J. F. 1878a, 1887; Montessus, F. B. 1886; Prévost, F. 1858.

GERMANY

Book. Text in German. English edition. 1909. Herman, O. 1903c; Schuster, W. 1903b, 1906c.

General. Baer, W. 1913; Baer, W. & Uttendorfer, O. 1897a; Eckstein, K. 1907; Hodek, E. 1882; Homeyer, E. F. 1877; Loos, C. 1896-97; Parrot, C. P. & Leisewitz, W. 1905; Rzehak, E. C. 1897; Walter, J. 1892.

HUNGARY

General. Herman, O. 1903b. Book. Text in English. Herman, O. 1907c.

ICELAND

Book. Text in German. Hantzsch, B. 1905.

ITALY

General. Passerini, N. & Cecconi, G. 1907.

North America

General. Beal, F. E. 1899a, 1909; Crafts, H. A. 1910. Nearctic birds. McAtee, W. L. 1932d.

CANADA

General. Hewitt, C. G. 1914; Taverner, P. A. 1934.

British Columbia. Taylor, L. E. 1913.

UNITED STATES

General. Dodge, J. R. 1865; Marshall, W. 1887; Palmer, T. S. 1900b.

New England. Book. Text in English. Forbush, E. H. 1907, 1908a.

Alabama. Book. Text in English. Howell, A. H. 1924.

Arkansas. Baerg, W. J. 1931; Howell, A. H. 1911.

California. Beal, F. E. 1905, 1910; Bryant, H. C. 1913a, 1926; Waite, M. B. 1906.

Dakota. Bailey, V. 1888.

Illinois. Forbes, S. A. 1880a, b, 1883, 1884, 1908; Gross, A. O. & Forbes, S. A. 1909.

- Indiana. Thompson, M. 1886.
 Iowa. Beal, F. E. 1879.
 Maine. Brewster, W. 1924; Norton, A. H. 1904.
 Maryland. Judd, S. D. 1902.
 Massachusetts. Forbush, E. H. 1903. Book. Text in English. Forbush, E. H. 1913b.
 Minnesota. Bailey, V. 1888. Book. Text in English. Roberts, T. S. 1932.
 Nebraska. Bruner, L. 1896.
 New Jersey. Stone, W. 1909.
 New York. Allen, A. A. 1914a.
 Ohio. Dury, C. 1886; Wheaton, J. M. 1882; Williamson, E. B. 1898.
 Oklahoma. Nice, M. M. & Nice, L. B. 1924.
 Pennsylvania. Surface, H. A. 1908, 1913.
 Texas. Oberholser, H. C. 1925.
 West Virginia. Brooks, E. A. 1916b; Johnston, I. H. 1923.
 Wisconsin. King, F. H. 1883.

WEST INDIES

- Porto Rico. Wetmore, A. 1916a.
 Trinidad and Tobago. Feilden, G. S. 1914.

Oceanica

- Java. Koningsberger, J. C. 1909.
 New Zealand. Reischek, A. 1886.
 Philippine Islands. McAtee, W. L. 1916a; McGregor, R. C. 1915.

AUSTRALIA

- General. Ashby, E. 1927; Edquist, A. G. 1911.
 Southern Australia. Book. Text in English. Hall, R. 1907.

ECONOMIC RELATIONS OF VARIOUS BIRDS WITH LOCALITY STATED

- Anas*. Louisiana. McAtee, W. L. 1910c.
Aquila. Alaska. Willett, G. 1927.
Ardea ibis. Egypt. Kirkpatrick, T. W. 1925.
Chen. Louisiana. McAtee, W. L. 1910d.

- Corvidae*. Europe. Madon, P. 1928; *Rörig, G. 1898c, 1900a, b, d.

- Corvus*. America. Kalmbach, E. R. 1918, 1920. France. Delamarre de Monchaux, —. 1926. North America. Barrows, W. B. & Schwarz, E. A. 1895.

- Corvus f. frugilegus*. Germany. Rörig, G. 1900d.

- Falconoidea. North America. Book. Text in English. May, J. B. 1935.

- Fringillinae. British Isles. Jourdain, F. C. 1927.

- Haliaeetus*. Alaska. Crabb, E. D. 1922.

- Passer domesticus*. North America. Cook, C. B. 1890; Estabrook, A. H. 1907.

- Phasianidae. Massachusetts. McAtee, W. L. 1914d.

- Pici. Hungary. Ertl, G. 1904. Oregon. Book. Text in English. Neff, J. A. 1928.

- Sturnus vulgaris*. Ontario. Lewis, H. F. 1927a.

ECONOMIC SIGNIFICANCE OF PREDACEOUS BIRDS

- General. Bailey, B. H. 1918; Fisher, A. K. 1909; Lataste, F. 1888, 1892; Smyth, E. A. 1894.

- America. McAtee, W. L. & Stoddard, H. L. 1930. Canada. Falcones. Taverner, P. A. 1918. Europe. Book. Text in French. Madon, P. 1933. Iowa. Bailey, B. H. 1918. Ohio. Kirkpatrick, J. 1859. Poland. Taczanowski, W. 1860. South Africa. Haagner, A. K. 1908b.

- Birds of prey as natural monuments. Bräss, M. 1912b.

- Feeding upon *Passer* by *Otus*. Warren, B. H. 1896a.

- Hawk extermination. Carey, H. R. 1926.

- Is *Corvus brachyrhynchos* a bird of prey? Nauman, C. H. 1868.

HABITS OF BIRDS WHICH ARE DISADVANTAGEOUS TO MAN

- Book. Text in English. *Corvus b. brachyrhynchos*. Brooks, A. 1925b.

- General. Chernel von Chernelhaza, I. 1901a; Collinge, W. E. 1917a; Samuels, E. A. 1866. In war time. McAtee, W. L. 1917a.

Africa. McAtee, W. L. 1913c.

Belgium. Book. Text in French.
Dubois, A. J. 1893.

California. McAtee, W. L. 1932c.

England. Book. Text in English.
Gunther, R. T. 1917b.

France. Book. Text in French.
Arenberg, E. 1912.

Agelaius. Fisher, A. K. 1888b.
Anserinae. Stearns, R. E. 1882b. *Buteo*.
Greenhorn, —. 1876. *Corvus*. Boas,
J. E. 1911; Dutton, J. 1865. *Corvus c.*
cornix. Mühlig, G. G. 1865. *Cyanocitta*
cristata. Howe, E. D. 1901.
Fringillidae. Kashkarov, D. & others
1926. *Garrulus*. Loos, C. 1902a. *Gyps*.
Evans, M. S. 1895a. *Gyps kolbii*.
Taylor, C. H. 1908. Hedge birds. R.,
J. 1837. Icteridae. Fisher, A. K. 1888c.
Parus. Butterfield, E. P. 1908b. *Passer*.
Coues, E. B. 1878b, 1880a, 1882; Dear-
born, N. 1912; Osgood, F. 1899.
Picidae. Ertl, G. 1904. *Psittacus*.
Evans, M. S. 1895a. *Sphyrapicus*.
McAtee, W. L. 1913a. *Sturnus vul-*
garis. Collinge, W. E. 1919a; Rohne,
M. 1909; Kelso, J. E. 1910. See also
other publications dealing with this
species. *Troglodytes aëdon*. Sherman,
A. R. 1925a, b, c.

Buds of trees destroyed. Altum, B.
1897.

Damage done by roosting birds to
residential property. McAtee, W. L.
1926a.

Destruction of young pheasants by
Quiscalus. Foster, F. B. 1927.

Eating useful insects. McAtee, W. L.
1928b. Bees. Gurney, J. H. Jr. 1889a;
Hamet, H. 1869-70.

Agriculture, injuries to

General. Hepburn, A. 1843c; Holmes,
E. 1857.

CROP DESTRUCTION

General. Arinkina, T. & Kolesuikov,
I. 1927; R., J. 1837.

Grain. Africa. Schlupp, W. F. 1922.
Grain-eating birds. Beal, F. E. 1898a.
Columba f. fasciata. Barnes, E. P. 1916.

Vegetable crops. *Aulada*. French, C.
1914. Garden peas. *Coccothraustes*.
Bunyard, P. F. 1908a.

Carnivorous habits

Carnivorous habits of sparrows a
nuisance in Germany. Arndt, W. 1922.

Injuries incurred by man from
attacks by magpies, eagles, and crows
in Australia. Cleland, J. B. 1910,
1913b.

Killing young lambs. *Pica*. Horne,
C. 1871.

Poultry damage. *Corvus*. Cole, L.
J. 1909a.

Wounding horses and cattle. *Pica*.
Stephens, T. C. 1921.

Wounding sheep, especially in kid-
neys. *Pica*. Berry, S. S. 1922; Schorger,
A. W. 1921.

SHEEP-KILLING PARROT

Book. Text in English. Marriner,
G. R. 1909.

General. *Nestor notabilis*. Godfrey,
F. R. 1898; Marriner, G. R. 1907, 1908;
Potts, T. H. 1881; Wharton, H. T. 1880;
White, T. 1894, 1895.

Origin of habit. Haacke, W. 1896a.

Dissemination of diseases and pests

Chicken and bird mites. *Passer*.
Ewing, H. E. 1911.

Weed seeds. Collinge, W. E. 1913a,
1914a.

ANIMAL DISEASES

General. Lay, G. W. 1911.

Anthrax. *Corvus*. Mollet, F. 1913.

Avian tuberculosis in swine. Junack,
M. 1913-14; Van Es, L. 1924.

Bubonic plague in poultry. Stevens,
A. F. 1906.

Foot and mouth disease of cattle.
Stockman, S. & Garnett, M. 1923;
Taylor, W. P. & Bryant, H. C. 1924;
Thomson, A. L. 1924a.

Hog cholera. *Columba*. Dorset, M.,
McBryde, C. N., Niles, W. B., & Rietz,
J. H. 1918. Probably not distributed
by birds. McAtee, W. L. 1918b.

Trombicula akamsushi infection.
Kawamura, R., Hattori, S., & Yama-
guchi, M. 1921.

TREE DISEASES

General. *Sphyrapicus*. McAtee,
W. L. 1924d.

Chestnut-blight fungus. Heald, F. D. & Studhalter, R. A. 1914; McAtee, W. L. 1915d, 1916c. *Sphyrapicus*. Fulton, H. R. 1915.

Red-colored fungus entering holes made by *Sphyrapicus*. Hubert, E. E. 1923.

Fish destruction

General. Annin, J. 1884; Knauer, F. K. 1914; Munro, J. A. 1923; Smiley, C. W. 1884.

Consideration of fishing interests and bird protection. Finsch, O. 1895.

ENEMIES OF FISH

General. Benecke, B. A. 1886; Meixner, —. 1916. Many species. Schuster, W. 1907-08. Sea birds. Collinge, W. E. 1920c, 1926b. *Corvus* & *Larus*. Fischer-Sigwart, H. 1916a. *Pelecanus*. Hall, E. R. 1925. *Phalacrocorax*. Mattingley, A. H. 1908b, 1927; Swindells, A. W. 1908; Taverner, P. A. 1915.

Fish poaching. Knauthe, K. 1891.

Hatchery fish. *Alcedo*. Raveret-Wattel, C. 1898.

Trout enemies. Haack, D. 1884.

Horticulture damage

General. Cooke, W. W. 1898; Cummings, A. L. 1880; Praeger, W. E. 1900; Surface, H. A. 1903; Theobald, F. V. 1907.

Coca industry. Ritchie, A. H. 1918.

Crocuses. MacLachan, R. 1892.

Pecan culture. *Corvus b. brachyrhynchos*. Hoffman, W. E. 1924.

Relation to horticulture. Anon. 1906b. *Fringilla coelebs*. Ritzema Bos, J. 1901.

FRUIT INDUSTRY

General. Beal, F. E. 1900b, 1905, 1907; Collinge, W. E. 1915a; Forbush, E. H. 1895; French, C. 1905; Smith, R. & Ellis, G. 1890.

Birds injurious to fruit. Blaisdell, F. E. 1886. *Oreoscoptes montanus*. Kennedy, C. H. 1911b.

Diversion of fruit-eating birds by periodical cicadas. McAtee, W. L. 1920a.

Eating apple blossoms. *Bombycilla cedrorum*. Craig, J. 1896.

Destruction to various fruits

Cacao. *Celeus*. Smith, A. P. 1927.

Grapes. Butler, A. W. 1912. *Dendroica tigrina*. Burns, F. L. 1915a; Roberts, I. G. 1915.

Not harmful to apple crop. *Carpodacus p. purpureus*. Magee, M. J. 1926a.

Olives. *Sturnus vulgaris*. Moser, L. C. 1892.

Oranges. *Melanerpes*. Brewster, W. 1889.

INSECTIVOROUS BIRDS

Books. Text in English. Trimble, I. P. 1865; Wardle, R. A. & Buckle, P. 1923.

General. Allen, J. A. 1881a; Buckman, J. 1865; Butler, A. G. 1910; Buvignier, —. 1874; Chatel, V. 1857, 1861; Collinge, W. E. 1918d, e; Dankler, M. 1902; Eckstein, K. 1902; Firby, E. F. 1866; Henshaw, H. W. 1908b; Loos, C. 1894, 1896-97, 1902c; Lósy, J. 1911; McAtee, W. L. 1924a, 1926e, 1928a; Michener, E. 1864; Palmer, F. H. 1873; Passerini, N. 1900; Ferris, E. 1873, 1875; Reh, L. 1910a; Rey, J. G. 1909a; Rösig, G. 1898b; Rudow, F. 1891; Schuster, W. 1906a, 1908c, 1909b; Sherman, F. 1921; Soule, C. G. 1899; Tothill, J. D. 1918, 1922; Turrel, —. 1874; Walsh, B. D. 1867; Walton, W. R. 1916; Walton, W. R. & Luginbill, P. 1916; Anon. 1891b, 1915b, 1922b. Many species. Anon. 1909b.

Insectivorous habits of various birds. *Alauda arvensis*. Le Baron, W. 1870. *Ardea ibis*. McAtee, W. L. 1923c. *Chordeiles*. Jennings, A. H. 1908. *Corvus frugilegus*. Rácz, B. 1914. *Gallus*. Sedlacek, W. 1914; Anon. 1922b. *Hirundinidae*. Henshaw, H. W. 1907b. *Larus*. Dutcher, W. 1905. *Loxia*. Bütikofer, E. 1909. *Meleagris*. Anon. 1832b. *Passer*. Wilmot, N. E. 1917. *Perdix*. Csiki, E. 1912. *Pomatorhinus*. Chisholm, A. H. 1908a. *Spizella p. passerina*. Schneck, S. 1880. *Sturnella*. Beal, F. E. 1895a, 1913.

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Henderson, J. 1913b; Henshaw, H. W. 1908a, 1913; Lindner, F. 1899b; McAtee, W. L. 1920b, c, 1922d, 1931b, e; Merriam, F. A. 1896a; Montessus, F. B. 1896; Nash, C. W. 1898; Pačoskij, I. K. 1909; Perkins, G. H. 1872; Pistone, A. 1896; Reeks, H. 1872; Russ, K. F. 1891; Samuels, E. A. 1864, 1866, 1868; Siedlecki, M. 1933; Singley, J. A. 1888; Stearns, W. A. 1883; Theobald, F. V. 1907; Travers, W. T. 1903; Tschudi, F. 1854, 1862; Turrel, —. 1874; Webster, F. M. 1913; Wheaton, J. M. 1874; Wielligh, G. R. 1914.

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Bird enemies. Newstead, R. 1910.
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Destruction of cotton boll weevil in winter by birds. Howell, A. H. 1908.

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General. *Struthio*. Merlato, L. 1883. *Sula* [*Moris*] *bassana*. Cunningham, R. O. 1866.

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"Off" flavors of flesh of game birds. McAtee, W. L. 1919d.

Edible birds'-nests

General. *Collocalia*. Blyth, E. 1860; Green, J. R. 1884, 1885-86; Guppy, H. B. 1886a, b; Layard, E. L. 1885.

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Amino sugar content of edible birds'-nests. Wang, C. C. 1921b.

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General. Hirundinidae. Anon. 1889c.

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General. *Columba*. *Kupffer, C. W. & Benecke, B. A. 1879. *Gallus*. *Kupffer, C. W. & Benecke, B. A. 1879; Malpighi, M. 1675, 1687; Tredern, L. S. 1808. *Larus* & *Passer*. *Kupffer, C. W. & Benecke, B. A. 1879.

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Biochemical activity

General. Levene, P. A. 1900, 1902. *Anas*. Prout, W. 1822. *Gallus*. Marza, V. 1929; Preyer, W. T. 1882; Prout, W. 1822; Sacc, F. 1847. *Meleagris*. Prout, W. 1822.

Biochemical and serological studies of incubated eggs. *Gallus*. Idzumi, S. 1924.

Calcium transfer from shell to embryo. *Gallus*. Buckner, G. D., Martin, J. H., & Peter, A. M. 1925c.

Catabolic chemical activity. *Gallus*. Murray, H. A. 1925a, b.

Catalytic activity. Winternitz, M. C. & Rogers, W. B. 1910.

Cornification. *Columba* & *Gallus*. Zabłudowski, J. 1880.

Distribution and changes in inorganic salts. *Gallus*. Horning, E. S. & Scott, G. H. 1932.

Elimination of waste products. *Gallus*. Boyden, E. A. & Fiske, C. H. 1927.

Lactic acid formation. *Gallus*. Kinzuchi, A. 1912.

Nitrogen excretion. Needham, J. 1926c.

Physico-chemical changes in albumin. *Gallus*. Wladimiroff, G. E. 1926.

Urea production. Needham, J. 1926b.

Uric acid production. Needham, J. 1926b.

Hydrogen ion concentration

General. *Gallus*. Murray, H. A. 1926e.

Changes in albumen and yolk during incubation. *Gallus*. Romanoff, A. L. & Romanoff, A. J. 1929.

BIOPHYSICS

General. *Gallus*. Chattock, A. P. 1925; Romanoff, A. L. 1930.

Desiccation effects. *Gallus*. Féré, C. 1894k.

Efficiency of development. Needham, J. 1927a.

Electrical phenomena. *Gallus*. Bloch, H. 1888; Dareste, C. 1895. Includes *Gallus*. Windle, B. C. 1895.

Electrocardiograph studies. *Gallus*. Küllbs, F. 1920.

Gas effects. Viborg, E. N. 1805.

Gases necessary for environment of embryo. Riddle, O. 1924b.

Light effect on development of embryo. *Gallus*. Perna, G. 1905.

Magnetism. *Gallus*. Maggiorani, C. 1879, 1884. Includes *Gallus*. Windle, B. C. 1895.

Mechanics of development. Books. Text in German. Includes birds. Roux, W. 1881. Includes *Gallus*. His, W. 1874.

Normal physical and physiologic conditions. *Gallus*. Dareste, C. 1887a.

Osmosis through egg membranes. Anon. 1874a.

Osmotic pressure of egg during incubation. Atkins, W. R. 1909b. *Gallus*. Białaszewicz, K. 1912b.

Water absorption in formation of sub-germinal cavity. *Columba*. Bartelmez, G. W. & Riddle, O. 1924.

Energy sources

General. *Gallus*. Needham, J. 1926d.

Carbohydrate metabolism. Needham, J. 1927b.

Developmental efficiency. Needham, J. 1927a.

Heat absorption. Moitessier, A. 1872.

Heat developed by the embryo. Merlato, L. 1883; Meyerhof, O. 1911.

Relation between absorption and combustion of fat and protein. Needham, J. 1927a.

Relation between combustion, constitution, and concentration. Needham, J. 1927a.

Transformation of living energy. *Gallus*. Romanoff, A. L. 1929g.

Irradiation of embryo

Mitogenetic rays. *Gallus*. Sorin, A. N. & Kisljak-Statkewitch, M. D. 1928.

Radium irradiation. *Gallus*. Tur, J. 1905e; *Vernoni, G. 1911.

Ultraviolet irradiation. Differential susceptibility. Hinrichs, M. A. 1927.

X-rays. Decreased mitoses. *Gallus*. Gaskell, J. F. 1911.

Polarity of embryo

General. *Gallus*. Dalton, J. C. 1881; Gerlach, L. 1882b; Kopsch, F. 1902; Rabaud, E. 1908a; Yarrell, W. 1826.

Inversion in polarity. *Bartelmez, G. W. 1918; Byerly, T. C. & Olsen, M. W. 1933.

Light effect. *Gallus*. Blanc, L. 1892; Perna, G. 1905.

Relation to rate of development of embryo. Heterotaxia. *Anas*. Féré, C. 1896i.

Rotation of embryo in egg. *Gallus*. Dareste, C. 1892.

Variation, causes of. *Gallus*. Féré, C. 1900b.

Temperature experiments

General. *Gallus*. Dareste, C. 1856a, 1865c, 1866a, 1869a, 1889c; Eycleshymer, A. C. 1907; Féré, C. 1894e; Saint-Loup, R. 1890b.

Characteristic temperature for contraction rate. Isolated fragments of heart. *Gallus*. Murray, H. A. 1926d.

Gradient effect on early embryology. *Gallus*. Tazelaar, M. A. 1928.

Influence of temperature on pulse rate. Inukai, T. 1925.

Nervous system, effects on. *Gallus*. Alsop, F. M. 1919.

HIGH TEMPERATURE, EFFECTS

General. *Gallus*. Féré, C. 1900c.

Lung diverticulum. *Gallus*. Weber, A. 1918.

LOW TEMPERATURE, EFFECTS

General. *Gallus*. Labbe, E. H. 1925; Lamson, G. H. 1918; Lipschütz, A. & Illanes, A. 1929; Mauro, F. 1923; Moran, T. 1925.

Cooling effects. Includes *Gallus*. Preyer, W. T. 1881.

Effect of cold on capacity of egg to develop embryo. *Gallus*. Colasanti, G. 1875.

Incubation without brooding when minimum temperature of 98–100° occurs in India. Hutchinson, R. F. 1880.

Low temperature prior to incubation. *Gallus*. Rabaud, E. 1899b.

Physiologic zero. *Gallus*. *Edwards, C. L. 1900, 1902; Kaestner, S. 1895; Kempen, C. V. 1901b; Rabaud, E. 1899b; Tirelli, V. 1899.

EARLY EMBRYOLOGY

Books. Text in German. Rauber, A. A. 1877b. *Gallus*. His, W. 1868.

General. Aldes, T. 1674b; Koster, W. 1865, 1866; Mitrophanov, P. I. 1898b, 1901a; Mordwilko, A. K. 1897; Schauinsland, H. H. 1891a; Virchow, H. J. 1897. Include birds. Balfour, F. M. 1875; Gegenbaur, C. 1861; His, W. 1900; Kollmann, J. K. 1885b; Mayer, A. F. 1865; Mitrophanov, P. I. 1902d; Mitsukuri, K. 1896; Schauinsland, H. H. 1903b; Virchow, H. J. 1897. Birds incidental. His, W. 1891; Samassa, P. 1895. Water birds. Mitrophanov, P. I. 1898a.

Anas. Funccius, T. 1909; Mihalkovics, G. V. 1875; *Mitrophanov, P. I. 1899a; Nicolas, A. & Weber, A. 1900; Rabl, C. 1915. *Anas* & *Anser* incidental. Greil, A. 1914. *Columba*. Funccius, T. 1909; Harper, E. H. 1902; Janošfk, J. 1882; *Patterson, J. T. 1907a. *Coracias garrulus*. Mitrophanov, P. I. 1898a. *Corvus*. *Mitrophanov, P. I. 1899a. *Corvus frugilegus*. Mitrophanov, P. I. 1901b. *Fringilla*. Funccius, T. 1909. *Gallus*. Balfour, F. M. 1873b; Balfour, F. M. & Deigh-

ton, F. 1882; Funccius, T. 1909; Gräper, L. 1927; His, W. 1866, 1876, 1877, 1882, 1902; Janošfk, J. 1882; Kaestner, S. 1897; Kidd, P. 1877; Kionka, H. 1894; Kölliker, R. A. 1884a, c; Koller, C. 1880a, b, 1882; Kopsch, F. 1898, 1901, 1902; Loisel, G. 1901d; Miller, A. M. & McWhorter, J. E. 1914; Mitrophanov, P. I. 1899a; Oellacher, J. 1869; Pander, C. H. 1818; *Patterson, J. T. 1907a, 1909a; Platt, J. B. 1889; Rabaud, E. 1899c; Rauber, A. A. 1876a, c, d; Serres, A. E. 1843a, 1856, 1860b; Shore, T. W. & Pickering, J. W. 1889; Virchow, H. J. 1875a, b; Weber, A. & Buvignier, A. 1903c, d; *Wolff, C. F. 1768. Include *Gallus*. Kopsch, F. 1898, 1901, 1902; Mihalkovics, G. V. 1875; Rabl, C. 1915; Sabotta, J. 1897. *Gallus* incidental. Greil, A. 1914. *Larus*. *Mitrophanov, P. I. 1899a. *Lyrurus*. Dehnel, G. 1927. *Melopsittacus*. Keibel, F. 1901b. *Numida meleagris*. Tur, J. 1902b. *Passer*. Patten, C. J. 1910b. *Psittacidae*. *Braun, M. 1880, 1881, 1882. *Serinus*. Funccius, T. 1909. *Sphenisciformes*. Schauinsland, H. H. 1891b. *Sterna macrura*. Mitrophanov, P. I. 1912. *Struthio*. Mitrophanov, P. I. 1896, 1897c, 1899a; Nassonow, N. V. 1894, 1896b, c. *Sturnus*. Funccius, T. 1909.

Models of early embryonic stages. Includes *Gallus*. Hammar, J. A. 1893.

Somatopleure. *Gallus*. Drasch, O. 1894.

Fertilization of egg

Albertus Magnus 1651; Bayer, A. 1877; Haller, A. 1770. Includes birds. Balbiani, E. G. 1879a.

Columba. Harper, E. H. 1902, 1904; Van Durme, M. 1914. *Gallus*. Cigna, G. F. 1788; Ivanov, E. J. 1924b; Lienhardt, M. 1923; Rossi, F. 1801; Tascher, P. 1876; *Tauber, P. 1875; Van Durme, M. 1914. *Parus*, *Passer*, *Regulus* & *Turdus*. Van Durme, M. 1914.

Competition of spermatozoa. *Gallus*. Dunn, L. C. 1926b.

Location of fertilization of egg. Coste, J. J. 1850a.

Nuclear changes in fertilization. *Columba*, *Gallus*, *Hirundo*, & *Passer*. Van Durme, M. 1912.

Selective fertilization. *Gallus*. Dunn, L. C. 1926b.

Time. *Columba*. Harper, E. H. 1904. *Gallus*. Patterson, J. T. 1910.

ARTIFICIAL INSEMINATION

General. *Gallus*. Ivanov, E. J. 1913; Payne, L. F. 1914; Rolf, A. F. 1916. Include birds. Ivanov, E. J. 1903, 1924a.

Artificial insemination with motile sperm from ovariectomized fowl. Domm, L. V. 1930a.

FACTORS AFFECTING FERTILIZATION

General. Dryden, J. 1897.

Age of parents. *Gallus*. Hays, F. A. 1928.

Importance of efficiency rather than number of spermatozoa. *Gallus*. Hutt, F. B. 1929b.

Season of year. *Gallus*. Curtice, C. 1903.

Stale sperm. *Streptopelia*. Riddle, O. & Behre, E. H. 1921a.

Time of maximum fertility. *Gallus*. Crew, F. A. 1927c.

Copulation factors

All eggs fertilized by one copulation. *Meleagris*. Mann, W. 1883.

Hens mated once only, laid fertilized eggs from third day for seven to twenty days. *Gallus*. Kusakari, T. 1927.

Length of period after copulation when fertile eggs are laid. *Gallus*. Chodziesner, M. 1929; Coste, J. J. 1850b; Jarvis, L. G. 1898; Kaupp, B. F. 1919b; Lau, H. 1894; Laurie, D. F. 1919; Lienhart, R. 1922.

Life period of spermatozoa in body of hen. *Gallus*. Crew, F. A. 1926d.

Period after copulation before eggs are fertile. *Gallus*. Dunn, L. C. 1926b; Martin, J. H. & Anderson, W. S. 1918; Sherwood, R. M. & Buss, W. J. 1913; Anon. 1909a. *Meleagris*. Shepard, E. M. 1883.

HATCHABILITY OF EGGS

Duration of vitality of germinal disk. Calasanti, G. 1878.

Eggs laid some time after copulation. *Gallus* & *Meleagris*. Jameson, —. 1821.

Frequent turning. *Gallus*. Insko, W. M. & Martin, J. H. 1933.

Fresh eggs carried long distance and yet incubated successfully. *Perdix*. Gloger, C. W. 1853d.

Maximum period between laying and brooding. *Carduelis* & *Fringilla chloris*. Rey, J. G. 1867.

Relation of male to hatchability. *Gallus*. Hays, F. A. 1926b.

Seasonal variation. *Gallus*. Curtice, C. 1903.

POLYSPERMY

Entrance of more than one sperm into ovum. For a good brief account in English of this phenomenon see Lillie, F. R. 1919, pp. 37-38.

General. Duval, M. M. 1895; Rückert, J. 1910. *Columba*. Harper, E. H. 1902. *Gallus*. Patterson, J. T. 1909c, 1910; Tur, J. 1907c.

Polyspermy and origin of the periblast nuclei. *Blount, M. P. 1909.

Triple fertilization. *Gallus*. Hancock, J. L. 1891.

Cleavage or segmentation of the egg

General. Duval, M. M. 1884c. Include birds. Bergmann, C. G. 1847; Hubrecht, A. A. 1912; Peter, K. 1922; Virchow, H. J. 1892b; Waldner, M. 1881.

Columba. *Blount, M. P. 1907, 1909; Van Durme, M. 1912, 1914. *Gallus*. Coste, J. J. 1850c; *Patterson, J. T. 1909c, 1910; Rauber, A. A. 1883; Van Durme, M. 1912, 1914. *Hirundo*. Van Durme, M. 1912. *Parus*. *Van Durme, M. 1914. *Passer*. Dubuisson, H. 1905b; Van Durme, M. 1912, 1914. *Regulus*. Van Durme, M. 1914. *Serinus*. Gasser, E. 1884. *Turdus*. Lécaillon, A. 1910j; *Van Durme, M. 1914.

Cell continuity in cleavage. *Gallus*. Cameron, J. & Gladstone, R. J. 1916a, b.

Early segmentation of male and female eggs compared. Serres, P. M. 1856.

Intercellular connections. *Gallus*. Andrews, E. A. 1907.

Period during passage through oviduct. Includes birds. Coste, J. J. 1847.

Gastrulation

Publications which deal with the type of gastrula formation in birds and with the development of the first two germ layers.

General. Assheton, R. 1912; Eismond, O. P. 1893-94, 1894. Include birds. Keibel, F. 1901a; Repiachov, V. M. 1892.

Anas. Mitrophanov, P. I. 1899a. *Columba*. *Patterson, J. T. 1907a, 1909b. *Corvus*. Mitrophanov, P. I. 1899a. *Gallus*. Kupffer, C. W. 1882-84; *Lillie, F. R. 1904a; Mitrophanov, P. I. 1899a; Müller, C. 1896. *Larus*. Mitrophanov, P. I. 1899a; Tichomirov, A. A. 1890. *Passer*. Kupffer, C. W. 1882-84. *Struthio*. Mitrophanov, P. I. 1899a. Includes *Anas*. Rabl, C. 1915. Include *Gallus*. Rabl, C. 1915; Rauber, A. A. 1880a. *Anas* & *Gallus* incidental. Greil, A. 1914.

Blastopore. Bellonci, G. 1883-84; Rauber, A. 1876a; Whitman, C. O. 1883; Wilson, H. V. 1894.

Concrescence theory. *Gallus*. Minot, C. S. 1890a; Whitman, C. O. 1883.

Blastoderm and germ layer development

General. Gasser, E. 1882, 1883. Include birds. Keibel, F. 1901a; Lvov, V. N. 1894; Mitrophanov, P. I. 1891a, 1900a; Schenk, S. L. 1878; Wolff, W. 1886.

Coturnix. *Mitrophanov, P. I. 1902c, e. *Gallus*. Berenberg-Gossler, H. 1914; Cameron, J. & Gladstone, R. J. 1916b; Disse, J. 1878; Duval, M. M. 1884a, b; *His, W. 1876, 1877; Kölliker, R. A. 1875, 1884a; Koller, C. 1880b, 1882; Nowack, K. 1902; Peremeschko, P. 1868; Waldeyer-Hartz, W. 1869; Wolff, W. 1882. Includes *Gallus*. Kollmann, J. K. 1884b.

Blastoderm without embryo. *Anas*. Weber, A. 1906.

Development. *Gallus*. Coste, J. J. & Delpech, J. M. 1833; Dansky, J. & Kostenitsch, J. 1880. *Streptopelia*. Dansky, J. & Kostenitsch, J. 1880.

Growth. *Gallus*. Strahl, H. & Grundmann, E. 1902. Growth of area vasculosa. Tur, J. 1910b.

Mesoderm-free region of the blastoderm. *Gallus*. Ravn, E. 1886.

Organ formation areas before primitive streak stage. *Gallus*. Hoadley, L. 1927.

Orientation of embryo in blastoderm. *Gallus*. *Peebles, F. 1904.

Regional difference in rate of oxidation. *Gallus*. Buchanan, J. W. 1926.

Sinus terminalis development. Includes birds. Szaniawski, W. 1926.

Vitelline area. *Gallus*. Duval, M. M. 1884b.

Yolk elements in cells of blastoderm. *Gallus*. Lavdowsky, M. & Tischutkin, N. 1899.

MESODERM

Development. Zumstein, J. J. 1887. Includes birds. Minot, C. S. 1890b. *Anas*. Berenberg-Gossler, H. 1914; Rabl, C. 1915; Rex, H. 1897; Röthig, P. 1907. *Columba*. Rabl, C. 1889a. *Gallus*. Berenberg-Gossler, H. 1914; Rabl, C. 1888a, b, 1889a, 1915. Includes *Gallus*. Hertwig, O. 1882. *Larus*. Röthig, P. 1907. *Larus ridibundus*. *Rex, H. 1901a, 1905. *Vanellus*. Röthig, P. 1907.

Blood vessel relations. *Gallus*. Klein, E. 1871.

Mesenchyme. *Gallus*. Clark, E. R. 1914.

Parablast. *Gallus*. His, W. 1876, 1882; Tur, J. 1906b.

Relation with yolk. *Gallus*. Romiti, G. 1882.

Tissue differentiation in mesoderm. Includes birds. Kollmann, K. J. 1884a.

PRIMITIVE STREAK AND RELATED STRUCTURES

A narrow thickening of the ectoderm in the caudal half of the pellucid area of the blastoderm. It is treated commonly in all general works on embryology.

Book. Text in German. *Gallus*. Dursy, E. 1866.

General. Bellonci, G. 1883-84; Gasser, E. 1879b; Jablonowski, J. 1897; *Lillie, F. R. 1904a; Mitrophanov, P. I. 1902b; Pratobevera, G. 1835; Waldeyer-Hartz, W. 1869; Wilson, H. V. 1894. Includes birds. Mitrophanov, P. I. 1900a.

Anas. Mitrophanov, P. I. 1899a, 1902a; Rabl, C. 1915. *Anser*. Gasser, E. 1877b, 1879b. *Columba*. Patterson, J. T. 1907a. *Corvus*. Mitrophanov, P. I. 1899a. *Gallus*. Assheton, R. 1896; Balfour, F. M. 1873a; Bergmann, C. G. 1862a; Duval, M. M. 1879, 1885b; Dursy, E. 1867; Gasser, E.

1877b, 1879b; *His, W. 1877; Jablonowski, J. 1897; Kopsch, F. 1902; Mitrophanov, P. I. 1899a; Nowack, K. 1902; *Peebles, F. 1898, 1903; Rabl, C. 1915; Samassa, P. 1890; Terazaki, T. 1910; Waldeyer-Hartz, W. 1869; Wetzel, R. 1925, 1926. *Larus*. Mitrophanov, P. I. 1899a. *Passer*. Bergmann, C. G. 1862a. *Sterna*. *Grohs, W. 1907; Mitrophanov, P. I. 1902a. *Struthio*. Mitrophanov, P. I. 1899a.

Age of appearance. Moleschott, J. 1870.

Concrescence theory. Minot, C. S. 1890a. Book. Text in English. Lillie, F. R. 1919.

Growth centers. *Gallus*. Wetzel, R. 1926.

Head process. *Anas*. *Rabl, C. 1915, 1923.

Independence from embryonic crescent. Mitrophanov, P. I. 1897f.

Primitive knot (Hensen's knot)

This structure is mentioned frequently in publications on early embryology.

General. *Gallus*. Wetzel, R. 1924.

Caudal region. *Anser*. Schwarz, D. 1889.

Position relations to

Embryo. *Gallus*. Peebles, F. 1903.

Neural tube. *Gallus*. Kaczander, J. 1887b.

Parthenogenesis

Development of egg without fertilization.

General. Duval, M. M. 1884d; Lécaillon, A. 1910g.

Anas. Chappellier, A. 1920. *Columba*. Bartelmez, G. W. & Riddle, O. 1924. *Fringillidae*. Chappellier, A. 1921. *Gallus*. Barfurth, D. 1896; Lau, H. 1894; Lécaillon, A. 1908b, 1909a, c, e, 1910b, c, d, e, g, h. *Pavo*. Lécaillon, A. 1909d, 1910b. *Phasianus pictus*. Lécaillon, A. 1914a. *Turtur* [*Streptopelia*] *risorius*. Lécaillon, A. 1914b. Hybrid *Anas* × *Cairina*. Chappellier, A. 1912c.

Cleavage normal and parthenogenetic compared. Lécaillon, A. 1910h.

Cytology. Attraction spheres and centrosomes. *Gallus*. Lécaillon, A. 1909c.

Relation to dermoid cysts of ovary. Duval, M. M. 1895.

Temperature effect. *Gallus*. Lécaillon, A. 1910a.

Variation in number of chromosomes. *Gallus*. Lécaillon, A. 1910d.

EGG TOOTH

A cornified papilla, situated on the dorsum of the embryonic beak near its apex, which is used in breaking the shell at hatching. It is lost soon after hatching.

Book. Text in German. Terra, P. 1911.

General. Anson, B. J. 1929; *Branca, A. 1906, 1907b, c, d, e; Mayer, A. F. 1842c; Willink, H. D. 1899a.

Anas. *Branca, A. 1907b, c. *Gallus*. Branca, A. 1906, 1907a, c, d, e; Yarrell, W. 1826. *Sterna* & *Struthio*. Röse, C. 1892. *Tringa pusilla*. Weinland, D. F. 1862c.

Two egg teeth found after 15–21 days of incubation and a few days after hatching. *Gallus*. Mayer, A. F. 1841.

Development

General. *Gallinula chloropus*. Willink, H. D. 1899b. *Gallus*. *Branca, A. 1907c, d; Gardiner, E. G. 1884; *Rosenstadt, E. B. 1902, 1912. *Melopsittacus*. Gardiner, E. G. 1884.

Cornification. Egg tooth. Rosenstadt, E. B. 1902. *Anas*. Branca, A. 1907c. *Gallus*. Branca, A. 1907c, d.

Histogenesis of egg tooth. Includes birds. Pondrelli, M. 1903.

EMBRYONIC MEMBRANES

General. *Gallus*. Hirota, S. 1894; Home, E. 1822; Leveillé, J. B. 1800; Schauinsland, H. 1903a.

Chorion. Serres, A. E. 1840.

Membranes of twin embryo from double-yolked eggs. *Gallus*. Sumulong, M. D. 1925.

Somatopleure. *Gallus*. Drasch, O. 1894.

Allantois

Book. Text in Latin. Fabricius ab Aquapendente, J. 1688.

General. Budge, J. 1875, 1881; Spampani, G. 1902. Includes birds. Hubrecht, A. A. 1912. *Gallus*. Budge, J. 1881; Duval, M. M. 1881, 1884e, 1885a; Hochstetter, F. 1888a; Leveillé, J. B. 1799-1800; Mertens, H. 1830; Olivetti, M. 1874; Rauber, A. A. 1880a; Ravn, E. 1898. *Motacilla*. Spampani, G. 1905. Muscipidae. Duval, M. M. 1881, 1884e, 1885a. *Passer & Pratincola*. Spampani, G. 1905.

Blood vessels. *Gallus*. Duval, M. M. 1884f.

Contractile fibers. *Gallus*. Vulpian, E. F. 1858a.

Development. *Gallus*. Dobrynin, P. 1871; Fülleborn, F. 1895; Gasser, E. 1874.

Growth. Boyden, E. A. 1924.

Histology. *Gallus*. Dantschakoff, W. 1917.

Homology with mammalian placenta. *Gallus*. Duval, M. M. 1883, 1884e, 1885a.

PHYSIOLOGY

General. *Gallus*. Vulpian, E. F. 1858b.

Allantoic fluid. Chemical composition and physical properties. *Gallus*. Kamei, T. 1927.

VASCULAR SYSTEM

General. *Gallus*. Duval, M. M. 1884f.

Capillaries. *Gallus*. Dalrymple, J. 1844.

Lymphatic plexus accompanying allantoic arteries. *Gallus*. Budge, A. 1881.

Perivascular lymphatic vessels of allantois. *Gallus*. Creighton, C. 1899.

Respiratory vascular plexus. *Gallus*. Dantschakoff, W. 1917.

Amnion

Book. Text in Latin. Fabricius ab Aquapendente, J. 1688.

General. Jacquart, H. 1845. Include birds. Hubrecht, A. A. 1912; Serres, A. E. 1840. *Anas & Corvus*. Tur, J. 1926. *Gallus*. Duval, M. M. 1881, 1885a; Leveillé, J. B. 1799-1800; Mertens, H. 1830; Shore, T. W. & Pickering, J. W. 1889; Tur, J. 1926. Muscipidae. Duval, M. M. 1881, 1885a.

Chemical composition and physical properties of amniotic fluid. *Gallus*. Kamei, T. 1927.

Development. *Gallus*. Lillie, F. R. 1903a, 1904a; Péterfi, T. 1913.

Folds of amnion entering lens invagination opening. *Gallus*. Szily, A. 1906.

Proamnion. *Gallus*. Ravn, E. 1895; Shore, T. W. & Pickering, J. W. 1889.

HISTOLOGY

General. *Gallus*. *Péterfi, T. 1913.

Epithelium. Hotz, A. 1878.

Perivascular lymphatic vessels. *Gallus*. *Creighton, C. 1899.

Smooth muscle fibers. *Gallus*. Verzár, F. 1908.

PHYSIOLOGY

General. *Gallus*. Vulpian, E. F. 1858b.

Experimental lesions. *Gallus*. Soboleff, I. 1883.

Yolk sac

General. Dantschakoff, W. 1908a, 1909b. *Gallus*. *Virchow, H. J. 1891, 1892a.

Capacity of epithelium to form yolk elements. *Gallus*. *Schaper, A. 1902.

Change in yolk sac during last days of incubation. *Gallus*. Virchow, H. J. 1889.

Post-embryonic development. *Anas*, *Columba*, & *Gallus*. Charbonnel-Sallé, — & Phisalix, C. 1886a.

Recession of yolk sac into abdominal cavity. Include *Columba* & *Gallus*. Giacomini, E. 1893a, b. *Gallus*. Vicq d'Azyr, F. 1791b, 1799.

Resorption of yolk. *Gallus*. Dubuisson, H. 1904; Jull, M. A. & Heywang, B. W. 1930.

Vitelline duct. *Columba*. Budge, J. 1847.

STRUCTURE

General. *Gallus*. Courty, A. 1849b.

Epithelium of yolk sac. *Gallus*. Virchow, H. J. 1875b.

Yolk nuclei. Include birds. Gasser, E. 1884; Virchow, H. J. 1892b.

Vitelline blood vessels

General. *Gallus*. Excellent plates.
*Popoff, D. 1894.

Capillaries. *Gallus*. Dalrymple, J. 1844.

INCUBATION

Incubation phenomena, usually involving the entire egg.

General. *Anas*. Horton, D. H. 1928. *Gallus*. Davy, J. 1867c.

Egg shell changes during incubation. Hantzsck, B. 1901.

Mortality during incubation. Dunlop, E. B. 1910. Causes. Tobias, L. 1852.

Yolk form and position changes during incubation. *Gallus*. Féré, C. 1897b.

METAMERISM

General. Tur, J. 1905f. Includes birds. Locy, W. A. 1895b. *Gallus*. Dexter, S. 1891; Williams, L. W. 1910.

Somite succession. *Gallus*. Hubbard, M. E. 1908; *Patterson, J. T. 1907b; Platt, J. B. 1889.

Head somites

General. Goronovitsch, N. 1892. *Anas*. Wijhe, J. W. 1882-83, 1886. Include *Gallus*. Hill, C. 1899, 1900a; His, W. 1887; Locy, W. A. 1895a. *Larus*, *Sterna*, & *Vanellus*. Wijhe, J. W. 1882-83, 1886. *Larus fuscus*. Meek, A. 1907.

Brain metamerism in early stages. Relation to cranial nerves. Include *Gallus*. Gräper, L. 1913; McClure, C. F. 1890. *Gallus* & *Phasianus*. Weber, A. 1900.

Occipital region of skull. *Gallus*. Jäger, J. 1926.

NUTRITION OF EMBRYO

General. Aldes, T. 1674a; Loisel, G. 1899a; Prévost, J. L. & Morin, A. 1846; Schenk, S. L. 1897. Include birds. Usov, S. A. 1915; Vicq d'Azyr, F. 1799. *Gallus*. Dareste, C. 1876e; Emrys-Roberts, E. 1908; Leveillé, J. B. 1799-1800.

Albumen assimilation. *Gallus*. Bywaters, H. W. 1913a; Carini, A. 1894a; Cavalié, M. 1901; Gasco, F. 1894.

YOLK ASSIMILATION

General. Peter, K. 1922. *Gallus*. Dubuisson, H. 1904; Jull, M. A. & Heywang, B. W. 1930.

Weight of unassimilated yolk at hatching. *Gallus*. Jull, M. A. & Heywang, B. W. 1930.

PHYSIOLOGY OF EMBRYO

General. Martin Saint-Ange, G. J. 1844. *Anas*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Gallus*. Baudrimont, A. E. & Saint-Ange, M. 1843; Murray, H. A. 1926a, b, c, d, e, f; Preyer, W. T. 1882; Rabaud, E. 1908c. Includes *Gallus*. Baudrimont, A. E. & Saint-Ange, M. 1851. *Meleagris*, *Numida*, & *Pavo*. Baudrimont, A. E. & Saint-Ange, M. 1843.

Relative developmental rates of epidermal and mesodermal structures in wing. *Anas* & *Pygoscelis*. Waterston, D. & Geddes, A. C. 1909.

Vitality of embryo. Calasanti, G. 1878; Hopfe, E. 1880.

Experimental embryology

General. *Gallus*. Doello-Jurado, M. 1914; Mitrophanov, P. I. 1897a, e, 1899b; Serres, A. E. 1843b.

Absorption of amniotic fluid. *Gallus*. Vrbitch, S. 1924.

Amnion removal. *Gallus*. Lillie, F. R. 1903b.

Correlative differentiation. Influence of component parts. *Gallus*. *Lillie, F. R. 1903a.

Effects of early handicaps. *Gallus*. Parker, S. L. 1929.

Electrolysis with needle. *Gallus*. Dehnel, G. 1929. Holmdahl, D. E. 1925b, c.

Endothelium development. *Gallus*. Reagan, F. P. 1917.

Germ layer development. *Gallus*. Strahl, H. & Grundmann, E. 1902.

Growth of germ layers. *Gallus*. *Schimkewitsch, V. M. 1902a, b.

Growth processes. Vital staining. *Gallus*. Gräper, L. 1911.

Humidity effect on growth. *Gallus*. Romanoff, A. L. 1929c.

Hyperthyroidism effects upon resistance to infection. *Gallus*. Parhon, C. J. & Parhon, C. 1914.

Mesonephric duct obstruction. Boyden, E. A. 1927.

Negative acceleration of growth with age. Tissue culture. *Gallus*. Cohn, A. E. & Murray, H. A. 1925.

Organ-forming regions. *Gallus*. Kopsch, F. 1927.

Puncturing effects. *Gallus*. Ferret, P. & Weber, A. 1904d.

Removal of part of albumen. *Gallus*. Schimkewitsch, V. M. 1902a.

Sectioned blastoderms, development of. *Gallus*. *Hoadley, L. 1926b.

Self-differentiation in grafted limb buds. *Gallus*. Murray, P. D. & Huxley, J. S. 1925b.

BLOOD VESSEL DEVELOPMENT

General. *Gallus*. Hahn, H. 1909; Reagan, F. P. 1917.

Aortic arches. *Gallus*. Bremer, J. L. 1928.

Susceptibility to hydrocyanic acid. Regional differences in rate of oxidation. *Gallus*. Buchanan, J. W. 1926.

Time when susceptibility to stimuli appears in heart. *Gallus*. Külbs, F. 1920.

Vital stains employed. *Gallus*. Wetzel, R. 1925.

EXPERIMENTAL INCUBATION

Desiccation. *Gallus*. Féré, C. 1894k.

Egg of *Gallus* in albumen of *Anas*. Loisel, G. 1900a.

Eggs deprived of their shell. *Gallus*. Féré, C. 1900f.

Immersion of eggs in lithium and magnesium salt solutions. Landauer, W. 1929a.

Movement of eggs. *Gallus*. Marcacci, A. 1885-86, 1889.

Suspended incubation. *Gallus*. Broca, P. 1862; Dareste, C. 1878.

Ventilation of incubation chamber. *Gallus*. Dareste, C. 1884.

Vertical position for egg. *Gallus*. Dareste, C. 1886b; Féré, C. 1897j; Geoffroy St. Hilaire, E. 1825; Umanski, E. 1926.

Warm water. *Gallus*. Dareste, C. 1879c.

Air pressure experiments

Increased atmospheric pressure. *Gallus*. Cunningham, B. 1927.

Low air pressure. *Gallus*. Aggaz-zotti, A. 1913a, b, 1915; Giacomini, C. 1894.

Experimental treatment of egg shell

Mercurial ointment coating. *Gallus*. Deakin, A. & Robertson, G. 1933.

Oiling. *Gallus*. Dareste, C. 1861b; Düsing, K. 1883.

Partial coating. *Gallus*. Féré, C. 1894l.

Varnishing portions. *Gallus*. Dareste, C. 1855, 1861b; Düsing, K. 1883; Tarulli, L. 1891.

Exposure of eggs to vapors of various substances. *Gallus*

General. Féré, C. 1896a.

Alcohol. Féré, C. 1893d, 1895d, 1896j, 1902a; Reese, A. M. 1912. Effects of rest. Féré, C. 1899c.

Ammonia vapor. Féré, C. 1899e.

Chloretone. Reese, A. M. 1912.

Chloroform. Féré, C. 1893e, 1897h; Reese, A. M. 1912.

Essences. Féré, C. 1893f, 1895d, 1896e.

Ether. Féré, C. 1893b; Reese, A. M. 1912.

Hydrocyanic acid. Regional differences in oxidations. Buchanan, J. W. 1926.

Mercury. Féré, C. 1894n.

Musk emanations. Féré, C. 1896d.

Nicotine. Féré, C. 1893c.

Phosphorus. Féré, C. 1895j.

Potassium iodide. Féré, C. 1899g.

Turpentine. Féré, C. 1893g.

Injection of various substances into albumen of incubating egg. *Gallus*

General. Ferret, P. & Weber, A. 1904g. Schimkewitsch, V. M. 1902a.

Alcohol. Féré, C. 1894i, o, 1897a; Fletcher, J. M., Cowan, E. A., & Arlitt, A. H. 1916; Schimkewitsch, V. M. 1902a, b.

Antipyrine. Féré, C. 1901b.

Atropine sulfate. Féré, C. 1897m.

Bacterial toxins. Féré, C. 1894m.

Blood. Féré, C. 1894f.

- Blood of pellegra patients. Ceni, C. 1898.
- Blood serum. Lienhart, R. 1927.
- Caffeine. Féré, C. 1900d.
- Chloral hydrate. Schimkewitsch, V. M. 1902a, b.
- Chloretone solution. Reese, A. M. 1912.
- Cocaine. Schimkewitsch, V. M. 1902b. Cocaine hydrochloride. Féré, C. 1897k.
- Codeine solution. Féré, C. 1893h.
- Creatine. Féré, C. 1898e.
- Curare. Fubini, S. 1891.
- Dextrose. Schimkewitsch, V. M. 1902a.
- Glucose and glycerin. Féré, C. 1893i.
- Guanin. Schimkewitsch, V. M. 1902a, b.
- Hydrocyanic acid. Féré, C. 1897l.
- Lithium and magnesium salts. Landauer, W. 1929a.
- Lithium bromide. Schimkewitsch, V. M. 1902a, b.
- Lithium chloride. Schimkewitsch, V. M. 1902a.
- Magnesium chloride. Reese, A. M. 1912.
- Morphine hydrochlorate. Féré, C. 1893h.
- Nicotine. Féré, C. 1895b; Schimkewitsch, V. M. 1902a.
- Peptone. Féré, C. 1896h.
- Pituitrin. Cunningham, B. & Stanfield, W. 1928.
- Plumbi nitrate. Féré, C. 1893h.
- Potassium bromide. Féré, C. 1899b.
- Potassium iodide solution. Féré, C. 1899g; Schimkewitsch, V. M. 1902b.
- Potassium sulphocyanide. Schimkewitsch, V. M. 1902b.
- Potassium thiocyanate solution. Schimkewitsch, V. M. 1902a.
- Salt solutions. Féré, C. 1893i, 1896g.
- Sodium bromide. Schimkewitsch, V. M. 1902a, b.
- Strontium bromide. Féré, C. 1899b.
- Strychnine. Féré, C. 1897n.
- Sugar solution. Pouchet, H. C. & Beauregard, H. 1877; Schimkewitsch, V. M. 1902a, b.
- Toxins. Féré, C. 1896a.
- Trypan blue. Wislocki, G. B. 1921.
- Venom. Féré, C. 1896f.
- Water and other substances. Féré, C. 1895i; Schimkewitsch, V. M. 1902a, b.
- Xanthocreatinine. Féré, C. 1898f.
- GRAFTS. *Gallus***
- General. Murray, P. D. & Huxley, J. S. 1925a, b.
- Limb buds. Peebles, F. 1910.
- Chorio-allantoic grafts. *Gallus***
- General. Huxley, J. S. & Murray, P. D. 1924.
- Enteric nervous system chorio-allantoic membrane grafts. Van Campenhout, E. 1932.
- Head. 24-hour embryo. Murray, P. D. & Huxley, J. S. 1925a.
- Isolated primordia. Differentiation. Hoadley, L. 1924, 1925.
- Kidney grafts. Growth and differentiation. Anas & *Gallus*. Sandstrom, C. J. 1932.
- Limb buds. Hunt, E. A. 1932; Murray, P. D. 1926, 1928a; Murray, P. D. & Huxley, J. S. 1925b.
- Metanephros. Atterbury, R. R. 1923.
- Middle region of 48-hour embryo. Murray, P. D. & Huxley, J. S. 1925a.
- Neural tube growth. Agassiz, A. & Dantschakoff, W. 1922; Dantschakoff, W. & Agassiz, A. 1924.
- Rat embryo tissue. Hiraiwa, Y. K. 1930.
- Species specificity in differentiation of chorio-allantoic grafts. Sandstrom, C. J. 1929, 1932.
- LESIONS EFFECTS. *Gallus***
- General. Schrohe, A. 1862. *Gallus*. Schimkewitsch, V. M. 1902a, b.
- Amnion removal. Lillie, F. R. 1903b.
- Destruction of peripheral areas. Effect on differentiation of neuroblasts. Includes *Gallus*. Shorey, M. L. 1909.

Lesions of area pellucida. Mesoderm origin. Patterson, J. T. 1909a.

Limb bud extirpation. Effect on development of pectoral and pelvic girdles. Spurling, R. G. 1923.

Puncture of egg envelope. *Ferret, P. 1905; Ferret, P. & Weber, A. 1904b, d, g, i, j.

Results of destruction of various parts of developing embryo. Lillie, F. R. 1904b.

Shell removal. Gerlach, L. 1885; Loisel, G. 1900d.

MECHANICAL VIBRATIONS, EFFECTS FROM

General. *Gallus*. Féré, C. 1894j.

Electric battery and from tuning fork. *Gallus*. Féré, C. 1894i.

Loud sounds. Garman, C. F. 1670b; Schuster, W. 1911b.

TURNING EGGS

General. *Gallus*. Dareste, C. 1885c.

Frequent turning of eggs. *Gallus*. Insko, W. M. & Martin, J. H. 1933; Payne, L. F. 1920.

VARIOUS STRUCTURES, EXPERIMENTAL STUDIES

Amnion development. *Gallus*. Lillie, F. R. 1903a.

Ear. *Gallus*. Reagan, F. P. 1915a.

Endothelium and erythrocytes. Reagan, F. P. 1917.

Hensen's node. Role in development. *Gallus*. Hunt, T. E. 1931.

Tail-fold origin. *Gallus*. Lillie, F. R. 1909.

Factors influencing development of embryo

General. Lamson, G. H. & Kirkpatrick, W. F. 1918.

Internal pressure of egg. Effect upon developing embryo. *Gallus*. Tarulli, L. 1891.

Jarring in transportation. Dareste, C. 1876d.

Metabolism

General. *Anas*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Gallus*. Baudrimont, A. E. & Saint-Ange, M. 1843; Riddle, O. 1916d; Tangl, F.

1902-03. Includes *Gallus*. Needham, J. 1925. *Meleagris* & *Numida*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Passer*. Tangl, F. 1902-03.

Carbohydrate metabolism. *Gallus*. Needham, J. 1927a, b.

Correlations between growth differentiation and metabolic rate. *Gallus*. Murray, H. A. 1925a.

Metabolism as function of age. *Gallus*. Murray, H. A. 1926f.

Protein metabolism. Needham, J. 1926b.

Relation between absorption and combustion of protein and fat. Needham, J. 1927a.

Movements of embryo in egg

General. *Gallus*. Verzá, F. 1909. *Struthio*. Merlato, L. 1881.

Lateral flexion of body. *Gallus*. Féré, C. 1894b.

Position relations of embryo to primitive streak

General. *Gallus*. Holmdahl, D. E. 1925c; *Peebles, F. 1898, 1903.

Experimental studies. Relation of Hensen's node to differentiation of parts. *Gallus*. *Willier, B. H. & Rawles, M. E. 1931b.

Potencies of parts of early blastoderm

General. *Gallus*. *Hoadley, L. 1925, 1926a, 1927.

Potencies of transverse levels of blastoderm. *Gallus*. *Hunt, T. E. 1932.

Respiration of embryo

Books. Text in German. Baumgartner, J. 1861a. *Gallus*. Baumgartner, J. 1861b.

General. Hehl, J. C. 1796; Homeyer, A. & Kössler, P. 1862; Schwann, T. 1834a, b. *Anas*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Anser*. Hüfner, C. G. 1892. *Gallus*. Baudrimont, A. E. & Saint-Ange, M. 1843; Dareste, C. 1889c; Hüfner, C. G. 1892. *Meleagris*, *Numida*, & *Pavo*. Baudrimont, A. E. & Saint-Ange, M. 1843.

Concentration of carbonic acid. *Gallus*. Murray, H. A. 1926e.

CARBON DIOXIDE

Amount present in incubation in incubator and under hen. *Gallus*. *Lamson, G. H. & Edmond, H. D. 1914.

Conditions favorable for carbon dioxide production. Burke, E. 1925.

Relation of carbon dioxide to cell division. *Gallus*. Hasselbalch, K. A. 1900, 1902.

RESPIRATION EXPERIMENTS

Changing amount of air entering egg by scraping or coating shell. Gerlach, L. 1885.

Oxygen deficiency. *Gallus*. Wesselin, N. 1913.

Various respiratory conditions. *Gallus*. *Mitrophanov, P. I. 1900b.

WEIGHT LOSS OF EGGS
DURING INCUBATION

General. Gladstone, H. S. 1904; Prévost, J. L. & Dumas, J. B. 1825; Stewart, J. H. & Atwood, H. 1901. *Anas*. Horton, D. 1932b. *Gallus*. Féré, C. 1894h.

Relation between weight of egg and incubation period. *Anas* & *Gallus*. Féré, C. 1896c.

Weight percentage of various parts of egg and embryo each day from 6 to 20 days' incubation. *Gallus*. Fangauf, R. 1928.

Weights of eggs at different stages of incubation. Gröbbels, F. & Mobert, F. 1927a.

TERATOLOGY

See also under Teratology.

Abnormal eye production. *Gallus*. *Stockard, C. R. 1914.

Malposition. Head in small end of egg. Time and manner of determination. Byerly, T. C. & Olsen, M. W. 1933.

Position of embryo in eggs with two yolks. *Gallus*. Féré, C. 1898a.

Arrested development of

Area opaca of blastoderm. *Gallus*. Féré, C. 1900g.

Study of "clear" eggs. *Gallus*. Dareste, C. 1876d.

Ectopic development of embryo in

Abdominal cavity. *Anas* & *Gallus*. König-Warthausen, R. 1886.

Development to late stage in oviduct. Baumbach, —. 1923.

EXPERIMENTAL TERATOLOGY

See also previous entries under experimental embryology.

General. *Gallus*. Dareste, C. 1863b.

Anamniote embryo production. *Gallus*. Lillie, F. R. 1903a; Weber, A. 1903c.

Double blastoderm. *Gallus*. Mitrophanov, P. I. 1899b.

Heterotaxia (inversion of viscera). *Gallus*. Fol, H. & Warynski, S. 1883.

Importance of having evidence. *Gallus*. Féré, C. 1894g.

Reversal of heart beat. *Gallus*. Bremer, J. L. 1932.

Tumor production in grafts. *Gallus*. Féré, C. 1899f.

TRAUMATIC EFFECTS

General. *Gallus*. Féré, C. 1897f.

Mechanical pressure effects. *Omphalcephalus*. Rabaud, E. 1908d.

TORSION

Embryo without amnion. *Anas* & *Gallus*. Weber, A. 1903c.

Relation of embryo to asymmetrical development of amnion. Weber, A. 1902e.

VARIOUS PARTS OF EMBRYO

Cardiac jelly. *Gallus*. Davis, C. L. 1924.

Caudal region. *Anas*, *Anser*, & *Columba*. Schwarz, D. 1889. *Gallus*. Schumacher, S. 1928b; Schwarz, D. 1889.

Cephalothoracic region. *Gallus*. Cadiat, L. O. 1878a, b.

Cloaca. Aperture in dorsal wall of cloaca during third day of incubation. *Gallus*. Boyden, E. A. 1920-21.

Lymphatics. *Gallus*. Clark, E. L. 1912a.

Mesenteries. *Columba* & *Gallus*. *Brouha, M. 1898a. Includes *Gallus*. Broman, I. 1906.

Prothorax. Funccius, T. 1909.

Segmental duct. Includes birds. Brook, G. 1888.

Septum transversum. *Columba*. *Brouha, M. 1898a. *Gallus*. *Brouha, M. 1898a; Ravn, E. 1896, 1899; Schönbauer, L. 1915.

Sinus rhomboidalis. *Gallus*. Wetzel, R. 1925.

Vestigial mass of cells caudal to spinal cord and attached to it by fine fibers in 14-day embryo. *Gallus*. Tourneux, F. & Hermann, G. 1887.

Alimentary canal

General. Includes birds. Balfour, F. M. 1876a.

Five-day stage. *Gallus*. Boyden, E. A. 1919.

Fore gut. Many species. *Salvi, G. 1905. *Anas*, *Columba*, *Fringilla*, *Gallus*, *Serinus*, & *Sturnus*. Funccius, T. 1909.

Celom

General. Jones, F. W. 1913. Includes birds. Minot, C. S. 1890b. *Anas* incidental. Strahl, H. & Carius, F. 1889. *Columba*. *Brouha, M. 1898a. *Gallus*. *Brouha, M. 1898a; Dexter, S. 1891; Holmdahl, D. E. 1925a. Includes *Gallus*. Broman, I. 1906. *Sturnus*. Holmdahl, D. E. 1925a.

Extraembryonic celom. *Gallus*. For critical discussion see Sabin, F. R. 1916b; Budge, A. 1880.

Lesser peritoneal cavity. Includes *Gallus*. Mall, F. P. 1891-92.

Pericardial cavity. *Anas*, *Columba*, *Fringilla*, *Gallus*, *Serinus*, & *Sturnus*. Funccius, T. 1909.

Peritoneal canals. *Anas* & *Gallus*. Tuntler, J. H. 1915.

Pleuroperitoneal cavity. *Anas*, *Columba*, & *Fringilla*. Funccius, T. 1909. *Gallus*. Funccius, T. 1909; *Poole, M. 1909; Schenk, S. L. 1866. *Serinus* & *Sturnus*. Funccius, T. 1909.

Relations of celom to blood islands. *Anas*. Weber, A. 1907a.

Head

General. Includes birds. Allis, E. P. 1918. Includes *Gallus*. His, W. 1892.

Ectodermal placodes in head. *Passer*. Goldby, F. 1928.

Figures of sections. *Sterna*. Carlsson, A. 1896.

Morphological value of mandibular ossification, ear bones and Meckel's cartilage. Book. Text in French. Includes birds. Albrecht, R. C. 1886a.

Premandibular cavities. *Anas*. Nicolas, A. & Weber, A. 1900. *Gallus* & *Turdus migratorius*. Adelman, H. B. 1925, 1926.

Rathke's pouch. *Anas*. Nicolas, A. & Weber, A. 1900. *Gallus* & *Passer*. Salvi, G. 1903b.

Seessel's pouch. Include birds. Rossi, U. 1906; Saint-Remy, G. C. 1894b, 1895. *Anas*. Nicolas, A. & Weber, A. 1900. *Gallus* & *Passer*. Salvi, G. 1903a, b, 1905.

Selenka's "pharyngeal sac," a transitory diverticulum just posterior to Rathke's pouch. *Anas*. Bawden, H. H. 1893.

EYES

Accessory optic vesicles. *Gallus*. Locy, W. A. 1897.

Papillae of scleral conjunctiva—vestigial nestling down feathers. *Gallus*. Nussbaum, M. 1901c.

Parietal eye anlage. *Larus ridibundus*. Völker, O. 1908.

Pigmental patch on head. Homology with pineal eye of saurians. *Anser*, *Larus*, & *Sterna*. Klinckowström, A. 1892.

Pineal eye. *Gallus*. Duval, M. M. 1888.

Integument

Dermis. *Gallus*. Murray, P. D. 1928b.

Epidermal differentiation. *Gallus*. Remak, R. 1848, 1851a, b.

Epitrichial layer. Gardiner, E. G. 1884; *Rosenstadt, E. B. 1897.

Limbs

General. *Cypselus melba*. Zehntner, L. 1889.

Limb bones. *Gallus*. Schmalhausen, I. & Stephanowa, J. 1926.

Neck region

General. Includes *Gallus*. Rabl, C. 1886.

PHARYNX

Branchial clefts. Bemmelen, J. F. 1886a; Rathke, M. H. 1825b. Birds incidental. Garnier, R. 1890; His, W. 1889. *Gallus*. Kashchenko, N. F. 1887; Mall, F. P. 1887, 1888b. Include *Gallus*. Baer, K. E. 1827a, 1828a. Kölliker, R. A. 1886; Liessner, E. 1887, 1889; Rabl, C. 1886. *Passer*. Helgsson, C. 1913.

Ductus thyreoglossus. *Gallus*. Shigyo, S. 1921.

Evagination. Selenka, E. 1888.

Hypobranchial groove and duct. *Gallus*. Livini, F. 1902.

Perforation of pharyngeal membrane. *Gallus*. *Manno, A. 1903.

Suprapericardial bodies. Bemmelen, J. F. 1889.

Vestigial gill filaments. *Gallus*. *Boyden, E. A. 1918.

Branchial arches

General. Huschke, E. 1828; Kashchenko, N. F. 1887. *Gallus*. Huschke, E. 1827b; *Mall, F. P. 1887, 1888b; Rathke, M. H. 1828a. Birds incidental. Baudement, E. 1847; Garnier, R. 1890; Schwalbe, G. A. 1891b.

Branchial arch theory. Birds incidental. Gössnitz, W. 1903.

Derivatives. Includes birds. Verdun, P. 1898a. *Gallus*. Verdun, P. 1898b. Includes *Gallus*. Vialleton, L. 1908.

Operculum of pharyngeal pouches. Backward extension of hyoid arch. *Aegialites* & *Anas*. Nasonow, N. V. 1896d. *Apteryx*. Parker, T. J. 1892a, b. *Corvus*, *Gallus*, *Oedipod*, & *Sterna*. Nasonow, N. V. 1896d. *Struthio*. Nasonow, N. V. 1895a, 1896d.

Pharyngeal pouches

General. Bemmelen, J. F. 1885. *Gallus*. *Kranichfeld, H. 1914. Includes birds. Bemmelen, J. F. 1886a.

Derivatives

General. *Vanellus cristatus*. Sicher, L. 1921.

Epithelial vesical derivative. First branchial pouches. *Passer*. Vitali, G. 1911a.

Ultimobranchial bodies

General. *Anas*. *Rabl, H. 1907b. *Fulica* & *Gallinula*. Johnson, C. E. 1918b. *Gallus*. Ferrari, P. 1922; Johnson, C. E. 1918b; Terni, T. 1925b, 1927a. *Podilymbus*. Johnson, C. E. 1918a. *Sterna*. Johnson, C. E. 1918b.

Biological significance. *Gallus*. Terni, T. 1928.

Structure. *Gallus*. Terni, T. 1925b, 1927a.

Nervous system

General. *Gallus*. Béranek, E. 1886; Loewe, L. 1880a.

Neural crests. Goronovitsch, N. 1892.

BRAIN

General. Includes *Corvus*. Burckhardt, K. R. 1895. *Gallus*. Kamon, K. 1906.

Comparison of pineal body and paraphysis. Ferret, P. & Weber, A. 1904a.

Epiphysis cerebri as bilateral structure. *Gallus*. Cameron, J. 1904.

Forebrain. *Gallus*. Bianchi, L. 1906.

Two epiphyses at four days. *Gallus*. Hill, C. 1900b.

Value of furrows on mesal surface. *Gallus*. Gage, S. P. 1899.

NEURAL TUBE

General. *Anser* & *Gallus*. Mihálkovich, G. V. 1875.

Central canal and cilia. *Gallus*. Klein, E. 1880.

Epithelial lateral line sense organs. Vestigial structures. *Gallus*. Nussbaum, M. 1901c.

Neural plate. *Gallus*. Ferret, P. & Weber, A. 1904c.

Neurenteric canal. Eismond, O. P. 1891. Many species. *Hoffmann, C. K. 1883. *Anser*. Braun, M. 1882. *Struthio*. Nasonow, N. V. 1896c.

Neuroblasts. Includes *Gallus*. His, W. 1890.

Neurons. *Gallus*. Ramón y Cajal, S. 1890d; Retzius, G. 1893b.

Neuropore. *Anser*. Mathis, J. 1929. Secondary caudal neuropore. *Gallus*. Schumacher, S. 1928a, b, c.

Relations of neural tube to primitive streak. *Gallus*. Kaczander, J. 1887b.

Notochord

General. Barry, M. 1841. Many species. *Hoffmann, C. K. 1882, 1883. Include birds. Held, H. 1921; Lvov, V. N. 1887, 1894. *Anas*. Kann, M. 1888. Includes *Buteo*. Usov, S. A. 1906. *Gallus*. Harman, M. T. 1922; Kann, M. 1888; Rabaud, E. 1899a; Seessel, A. 1877. Include *Anser* & *Gallus*. Mihálikovics, G. V. 1874, 1875.

Caudal end of notochord. Includes birds. Schmidt, V. 1893. Relation to caudal end of vertebral column. Schmidt, V. 1895.

Entodermal origin of notochord. *Gallus*. Gerlach, L. 1881a.

Histology of notochord. Includes *Anser* & *Gallus*. Müller, W. 1871a. Includes birds. Studnicka, F. K. 1898.

Hypochordal crest. Adjacent to notochord. *Gallus* & *Serinus*. Ganfini, C. 1907a.

Prechordal plate. Significance. Adelman, H. B. 1922.

Retrogression. *Gallus*. Leboucq, H. 1880. Includes *Gallus*. Bruni, A. C. 1912.

ROSTRAL END

General. Includes *Anas* & *Gallus*. Saint-Remy, G. C. 1896.

Relations

General. *Gallus* & *Turdus m. migratorius*. *Adelmann, H. B. 1926.

Relation to hypophysis in development. *Anas* & *Gallus*. Saint-Remy, G. C. 1894a, b. Includes *Gallus*. *Atwell, W. J. 1915.

Relationship to hypophysis and Rathke's pocket. *Gallus*. Romiti, G. 1885, 1886.

Transitory palatine pouch. Birds incidental. Selenka, E. 1888.

Proctodeum

General. *Meleagris*. Retterer, E. & Lelièvre, A. 1911a.

Histogenesis. *Anas* & *Meleagris*. Retterer, E. & Lelièvre, A. 1912.

Vascular system

General. *Gallus*. Budge, A. 1886; Dareste, C. 1866b.

BLOOD ISLANDS IN BLASTODERM

General. *Gallus*. Van der Stricht, O. 1893; Vialleton, L. 1892b.

Arrangement. Tur, J. 1929.

BLOOD VESSELS

General. Mehnert, E. 1896b. *Gallus*. Balfour, F. M. 1873c; Drasch, O. 1894.

Atypical capillary involution. *Gallus*. Thoma, R. 1901a.

Cardinal veins. *Anas*. Nishimura, Y. 1927. *Gallus*. Sabin, F. R. 1915.

Dilations of blood vessels. *Gallus*. Féré, C. 1894a.

Ductus arteriosus. Anon. 1822.

Extraembryonic circulation. Includes *Columba*, *Corvus*, *Gallus*, *Meleagris*, & *Numida*. Tur, J. 1907b.

Mesentery of postcava. Hochstetter, F. 1888b.

Pulmonary blood vessels. *Gallus*. Squier, T. L. 1916.

Aortic arches

General. Many species. Mackay, J. Y. 1889. Include birds. Baer, K. E. 1827a, 1828a; Bemmelen, J. F. 1886a. *Anas*. Rabl, H. 1905. *Gallus*. Boas, J. E. 1888; Huschke, E. 1827b; Kashchenko, N. F. 1887; Kranichfeld, H. 1914; Sabin, C. G. 1905. Include *Gallus*. Locy, W. A. 1905, 1906, 1912; *Rathke, M. H. 1857; Reichert, C. B. 1837.

Anomalous persistence of fourth left arch in a sixteen-day stage. *Gallus*. Pohlman, A. G. 1920.

Derivatives of aortic arches. Include birds. Baer, K. E. 1828a; Can-nieu, A. 1897. *Vanellus cristatus*. Sicher, L. 1921.

Mechanical processes involved in the formation of the aortic arches. *Gallus*. Congdon, E. D. & Wang, H. W. 1926.

Transformations of aortic arches. Many species. *Sabatier, C. P. 1874.

Factors governing position of celiac artery

General. *Gallus*. Bremer, J. L. 1924.

Effect of nerves on position of celiac artery. *Gallus*. Bremer, J. L. 1925.

ENDOCRINOLOGY

Only a small number of references to endocrinology are cited here. Most of the references to this subject will be found under the various ductless glands.

Book. Text in English. Includes birds. Hoskins, R. G. 1922.

Endocrine gland secretions—effects on hen-feathered fowls. Morgan, T. H. 1920c.

Failure of theelin and thyroxin to influence plumage and eyecolor of *Euphagus cyanocephalus*. Danforth, C. H. & Price, J. B. 1935.

Gonad extracts—effects on growth and reproduction. *Gallus*. Hogben, L. T. 1924.

Ovarian tissue-feeding effects. Moschini, D. G. 1929.

Resistance to lethal dose of insulin. *Columba*. Riddle, O. 1923d.

HORMONE EFFECTS ON

Maternal instinct. Riddle, O. 1935.

Ossification in chondrodystrophia and "sticky" embryos. *Gallus*. Sun, T. P. 1932.

EVOLUTION

See also under Adaptation, Genetics, Locomotion: Flight, Paleontology, Speciation, and Variation.

Books. Text in English. Bannerman, D. A. 1922b; Beebe, C. W. 1906a; Darwin, C. R. 1859, 1868, 1871; Hagedoorn, A. L. & Hagedoorn, A. C. 1921; Heilmann, G. 1926; Marriner, G. R. 1909; Morgan, T. H. 1903; Pycraft, W. P. 1910a; Scharf, R. F. 1911; Wallace, A. R. 1876, 1878, 1895.

Text in French. Cuénot, L. 1925.

Text in German. Haeckel, E. H. 1879.

Text in Latin. Klein, J. T. 1750.

General. Abel, O. 1910, 1911; Allen, F. H. 1923; Angelini, G. 1898; Benham, W. B. 1924; Böker, H. 1921; Braun, F. 1899e; Buller, W. L. 1895a; Cope, E. D. 1885; Edwards, —. 1905; Finn, F. 1892a, 1907; Gröbbels, F. 1911a; Heikertinger, F. 1921; Heilmann, G. 1914–15, 1926, 1929; Klein, J. T. 1750; Kleinschmidt, O. 1925; Lowe, P. R. 1915a;

Maynard, C. J. 1889d; Meinertzhagen, R. 1921d; Murray, A. 1868; Noll, F. C. 1889a; Nopcsa, F. 1929; Palacky, J. 1898b; Parker, W. K. 1887; Pycraft, W. P. 1902c, 1903e, 1906c, 1910a; Rothschild, L. W. 1901; Schuster, W. 1904c; Steinmann, G. 1922; Thielmann, R. 1899; Tristram, H. B. 1887; Wagner, M. 1868; Wallace, A. R. 1867a. Many species. Scott, W. E. 1905. Include birds. Alverdes, F. 1919; Heilmann, G. 1914–15; Parker, W. K. 1879a; Stejneger, L. H. 1907; Anon. 1869a.

Africa. Chapin, J. P. 1932; Lönnberg, A. J. 1929a.

Bahama Islands. Chapman, F. M. 1891b.

North America. Lönnberg, A. J. 1927b. Song birds. Trotter, S. 1923.

Trinidad. Chapman, F. M. 1892.

Alcae. Shufeldt, R. W. 1901b. Anatidae. Pantón, H. 1913. *Corvus corone*. Meise, W. 1928. *Diglossa*. Zimmer, J. T. 1929b. Domestic birds. Lotsy, J. P. & Kuiper, K. 1922. Domestic goose and Chinese goose. Goodacre, F. B. 1879. Drepanididae. Perkins, R. C. 1901. *Falco*. Stegmann, B. C. 1929. Flightless birds. Wilesworth, J. 1900. *Fregilupus varius*. Murie, J. 1874b. *Gallus*. Engelmann, T. W. 1876; Finn, F. 1902h; Jeittees, L. H. 1878. *Lanius*. Schiebel, G. 1906; Streets, T. H. 1883. Includes *Melospiza*. Davenport, C. B. 1905. Paleognathae. Hutton, F. W. 1892. Pelecanoididae. Murphy, R. C. & Harper, F. 1921. Phasianoidae. Gaillard, C. 1927; Stejneger, L. H. 1899b. Psittacidae. Fürbringer, M. 1889. *Pygoscelsis*. Waterston, D. & Geddes, A. C. 1909. Sphenisciformes. Slater, P. L. 1887; Waterston, D. & Geddes, A. C. 1909. *Struthio*. Duerden, J. E. 1919e; Lowe, P. R. 1928. Zonotrichiae. *Boulton, W. R. 1926b.

Atavism. Guyer, M. F. 1909a; Schroeder, J. 1877.

Degeneration. Spheniscidae. Bikessy, G. 1892. Degeneration and restoration. *Struthio*. Duerden, J. E. 1918, 1919b, 1920b.

Differences between nestling birds. Pycraft, W. P. 1907f.

Early history of canaries. Book. Text in English. Bannerman, D. A. 1922b.

Fecundity. *Gallus*. Selater, P. L. 1909a.

Form. Swynnerton, C. F. 1919.

Geographic origin of birds. North America. Allen, J. A. 1893a; Lönnberg, A. J. 1927b. South America. Ihering, H. 1927.

Habitats. Includes birds. Grinnell, J. 1924a.

Mimicry. Banta, A. M. 1912.

Nests. Pycraft, W. P. 1908b.

Origin of races of *Gallus*. Polish fowl. Dareste, C. 1867b. Silky and woolly fowls. Taubert, F. 1910.

Popular account of evolution of birds. Wallis, H. M. 1893.

Voice. Allen, F. H. 1919; Fabani, C. 1892b; Fowler, W. W. 1896; Olds, H. W. 1902; Witchell, C. A. 1890, 1896a, b. *Corvus*, *Pitta*, & *Podiceps*. Haecker, V. 1924b. *Serinus*. Christoleit, E. 1924.

Coloration

General. Keeler, C. A. 1893; Meyer, A. B. 1869; Read, R. H. 1895. Many species. Lucas, A. H. 1887; Swynnerton, C. F. 1916. Include birds. Swynnerton, C. F. 1919; Wallace, A. R. 1877. *Colaptes auratus*. Noble, G. K. 1936. *Columba*. Spöttel, W. 1914.

Color pattern. Bonhote, J. L. 1901b; Butler, A. G. 1919; Pycraft, W. P. 1904a. *Carpodacus*. Grinnell, J. 1911b. *Lanius*. *Schiebel, G. 1906. *Numida*. Allen, G. M. 1914. Phasianidae. Ghigi, A. 1903b.

Egg color. M'Aldowie, A. M. 1886.

Iridescence. Rensch, B. 1925d.

Habits

Breeding habits. Selous, E. 1916.

Courtship. Huxley, J. S. 1923.

Evolution of flight. Abel, O. 1912b; Döderlein, L. 1900; Finter, K. 1926; Hay, O. P. 1910; Lucas, F. A. 1916; Nopcsa, F. 1907; Schenkling-Prévôt, C. 1895c.

Incubation habits. Fezandie, C. 1893.

Migration habits. Cooke, W. W. 1915a; *Ekman, S. 1912.

Sheep-killing habits. *Nestor notabilis*. Book. Text in English. Marriner, G. R. 1909.

"Tumbling" flight. *Columba*. Howes, G. B. 1901.

Secondary sexual characters

General. *Podiceps c. cristatus*. Huxley, J. S. 1912c.

Sex ornamentation. Gadeau de Kerville, H. 1897. Includes birds. Lameeré, A. 1904.

EVOLUTION OF VARIOUS STRUCTURES

Beak. *Coturniculus*. Trotter, S. 1891.

Celom. Jones, F. W. 1913.

Color-producing structures. Strong, R. M. 1905b.

Diaphragm. Jones, F. W. 1913.

Ear. *Gallus*. Reagan, F. P. 1915a.

Eggs. Kutter, O. F. 1880. *Cuculus*. Baker, E. C. 1923.

Eye. Includes birds. Müller, W. 1874.

Hypophysis. Beer, G. R. 1924.

Jaw muscles. Adams, L. A. 1919.

One-sided reduction of ovaries and oviducts. Includes birds. *Gadow, H. F. 1912b.

Pineal body. Includes *Anas*, *Gallus*, & *Sterna*. Tilney, F. & Warren, L. F. 1919.

Red blood corpuscles. Include birds. Hayem, G. 1877, 1879.

Salivary glands. Botezat, E. 1910a.

Syrinx and reduction of larynx. Brunelli, G. 1904.

Tail. Many species. Marshall, W. A. 1872a. *Coturniculus*. Trotter, S. 1891.

Integument

General. *Lebedinsky, N. G. 1929.

Callosities of ankle. *Struthio*. Duerden, J. E. 1923.

Comb. *Gallus* male. Cunningham, J. T. 1907.

Scutes of feet. Boetticher, H. 1929. Loss of scutes. *Struthio*. Duerden, J. E. 1920c.

Nervous system

General. Includes birds. Gaskell, W. H. 1908.

Autonomic nervous system. Includes birds. Kuntz, A. 1911.

BRAIN

Cerebral cortex. Reduced from a multilaminar condition. Craigie, E. H. 1929a.

Cranial nerve nuclei positions. Includes *Gallus*. Kappers, C. U. & Vogt, H. 1908.

Forebrain. Kuhlenbeck, H. 1924.

Thalamus. Ingvar, S. 1923, 1924.

Organs of locomotion

General. Dei, A. 1896.

FLIGHT ORGANS

General. Laloy, L. 1909.

LIMBS

General. Includes birds. Ryder, J. A. 1887. Includes *Gallus*. Geddes, A. C. 1912.

Foot. Includes birds. Howes, G. B. & Hill, J. P. 1892b. *Struthio*. Duerden, J. E. 1919c, d, 1920c.

WING

General. Degen, E. 1894.

Claws on wings in nestling. *Opisthocomus*. Goeldi, E. A. 1895.

Hand. Birds incidental. Martins, C. F. 1872.

"Pelvic wing." Beebe, C. W. 1915.

Plumage

General. Chigi, F. 1908; Degen, E. 1903; Ewart, J. C. 1921, 1922; Ficalbi, E. 1883, 1891; Gadow, H. F. 1912a, 1922; Meijere, J. C. 1895. *Megascops*. Hasbrouck, E. M. 1893. *Paradisaea*. Marshall, W. A. 1871. *Phasianus*. Baker, E. C. 1926.

Head crests. Falconiformes. Goodchild, J. G. 1891b. *Serinus*. Duncker, H. 1923a. Book. Text in German. *Anas* & *Gallus*. Krautwald, F. 1910.

RECTRICES

General. *Podiceps*. Pycraft, W. P. 1909c.

Degeneration. Eight only and attached to pygostyle. *Podiceps fluviatilis*. Pycraft, W. P. 1909c.

Rectrices extremely long in Japanese fowl. Eighteen feet in length, sometimes. *Gallus*. Chamberlain, B. H. 1899; Cunningham, J. T. 1901, 1903; Finn, F. 1901a; Wright, L. 1902.

Skeleton

General. Osborn, H. F. 1900. Includes birds. Seeley, H. G. 1872. *Gallus*. Parker, W. K. 1887.

Degeneration of caudal vertebrae. *Podiceps fluviatilis*. Pycraft, W. P. 1909c.

Pectoral girdle. Heilmann, G. 1929.

Skull. *Apteryx* & *Numenius*. Parker, W. K. 1888a.

Vertebral column. Parker, W. K. 1888e. Includes birds. Gadow, H. F. & Abbott, E. C. 1897.

Wing bones. *Anas*, *Anser*, & *Gallus*. *Steiner, H. 1922.

Stomach

General. Döderlein, L. 1921.

Altmann's granules of stomach epithelium. Includes *Columba* & *Gallus*. Hirano, K. 1926a.

EXPERIMENTAL STUDIES

General. *Struthio*. Duerden, J. E. 1918.

Breeding experiments. *Columbae*. *Whitman, C. O. 1919b. To increase number of plumes. Duerden, J. E. 1918, 1919a, c.

Effect of continued administration of alcohol and other drugs. *Gallus*. Pearl, R. 1916a, e, h.

PHYLOGENY

General. Baur, G. H. 1887a, d; Brauns, D. A. 1890; Cope, E. D. 1885; Dana, J. D. 1863; Lowe, P. R. 1933a; Solowiow, P. 1911; *Wiedersheim, R. E. 1884. Include birds. Baur, G. H. 1887b; Heilmann, G. 1914-15. Birds incidental. Loisel, G. 1910. *Gallus* embryo. Needham, J. 1926b. *Struthio* and its allies. Lowe, P. R. 1928.

Animals intermediate between birds and reptiles. Huxley, T. H. 1868a.

Celom. Includes birds. Jones, F. W. 1913.

Color pattern phylogeny. Turdidae. *Gengler, J. 1914.

Gill arch theory. Birds incidental. Gössnitz, W. 1903.

Mallophaga as clue to phylogeny. Harrison, L. 1914, 1916a; Harrison, L. & others 1916.

Phylogenetic tree diagrams. Boulton, W. R. 1932; Pycraft, W. P. 1910a.

Precipitation reactions in tracing phylogenetic relationships. Erhardt, A. 1930.

Relation to dinosaurs. Cleland, J. B. 1887; Huxley, T. H. 1870; Versluys, J. 1910; Vetter, B. 1885.

Value of color characters. Stone, W. 1912.

Vestigial gill filaments. Boyden, E. A. 1918.

Vestigial characters

Fingers and claws on wings of nestlings. *Opisthocomus*. Brigham, E. M. 1885, 1919.

Phalanges. *Struthio*. Wray, R. S. 1887a.

Tarsal scutes with pores of reptilian character. Cotingidae. Riley, J. H. 1914.

THEORIES OF ORIGIN OF BIRDS

General. Gregory, W. K. 1916.

Convergent evolution. Rensch, B. 1923b, 1924a; Schiebel, G. 1928.

Orthogenesis. Columbidae. Whitman, C. O. 1907, 1919c.

Evolution by inheritance of acquired characters

Publications dealing with the conception as applied to birds.

General. Elliot, D. G. 1892b; Guyer, M. F. & Smith, E. A. 1920. *Opisthocomus*. Gadow, H. F. 1891-93. *Struthio*. Duerden, J. E. 1923; Lowe, P. R. 1926b.

Effect of alcohol and other drugs on progeny. *Gallus*. Pearl, R. 1916a, e, h.

Morphological evidence. Many species. Gadow, H. F. 1891a.

ENVIRONMENTAL EFFECTS

General. Bannerman, D. A. 1915; Rothschild, L. W. 1915.

Environmental effects on beak and tail. *Ammodramus*, *Coturniculus*, & *Passerculus*. Trotter, S. 1891.

Climatic effects

General. Serebrovskij, P. 1925. African birds. Lönnberg, A. J. 1929a.

Color and size in Alaska. Grinnell, J. 1910.

Glacial period. Charadriidae. Blanchard, W. T. 1886.

Rainfall effects. Ogilvie-Grant, W. R. 1915a.

Role of water. Includes birds. Gray, J. 1928.

Subspecific differentiation. Figgins, J. D. 1925.

Pigments

General. *Görnitz, K. 1923a.

Melanin pigment. Rensch, B. 1925d.

Evolution by mutation

General. Hachisuka, M. 1926a, 1927; *Stresemann, E. 1923a, 1926b. Many species. Stresemann, E. 1922, 1925e. Includes birds. Gates, R. R. 1917.

Accipiter leucosomus. Stresemann, E. 1923a. *Buarremon*. Chapman, F. M. 1923. *Gallus*. Davenport, C. B. 1913, 1914b; Quinn, J. P. 1934. *Gennaeus*. Ghigi, A. 1908a, 1909b. *Hierophasis*. Ghigi, A. 1912d, 1914a, b. *Ixoreus*. Law, J. E. 1931. *Numida*. Ghigi, A. 1908a. *Oenanthe opistholeuca*. Stresemann, E. 1925c. *Passer*. Bumpus, H. C. 1897b, 1898. *Pavo*. Ghigi, A. 1908a. *Perdix perdix*. Stresemann, E. 1927d. *Phasianus*. Ghigi, A. 1908a; Hachisuka, M. 1927. *Ploceidae*. Neunzig, R. 1927a. *Poëphila mirabilis*. Butler, A. G. 1906d. *Somateria mollissima*. Smalley, F. W. & Bonhote, J. L. 1907.

Featherless race. *Gallus*. Hecht, E. 1901.

Head crest. *Serinus*. Duncker, H. 1923a.

Melanism. *Oenanthe*. Stresemann, E. 1923c.

Parallel mutation. *Struthio*. Duerden, J. E. 1920d.

COLOR

General. Stresemann, E. 1923a, 1925e.

Asymmetrical skin color. Hutt, F. B. 1929a.

Selection, including natural and sexual selection

Books. Text in English. Include *Columba*. Darwin, C. R. 1859, 1868, 1871. Include birds. *Wallace, A. R. 1878, 1895. Text in German. Reichenau, W. V. 1887.

General. Curry, A. V. 1890; Hawkins, C. J. 1918, 1920; Headley, F. C. 1893; Kutter, O. F. 1877; Zitkov, B. M. 1910.

Gallus. Goodale, H. D. 1916a, 1918c; Pearl, R. 1917d. *Passer*. Bumpus, H. C. 1899; Harris, J. A. 1911; Townsend, C. W. & Hardy, J. H. 1909.

Digits in bird hand. Hurst, C. H. 1893, 1894.

Eggs. Nathusius, W. 1879a. Pied egg color. *Gallus*. Landois, H. 1901.

Elimination of self-colored birds. Davenport, C. B. 1908a.

Fecundity. *Gallus*. *Pearl, R. & Surface, F. M. 1909d.

Improving mongrel stock by use of standard-bred cockerels. *Gallus*. Lipincott, W. A. 1920b.

Isolation versus natural selection. *Dryobates*. Stejneger, L. H. 1906.

New breed incrossing of three breeds. *Gallus*. Lamon, H. M. 1921.

Sexual selection. Ischreyt, G. 1898; Selous, E. 1907, 1908a. *Machetes pugnax*. Selous, E. 1906-07. *Melopittacus*. Cinat-Tomson, H. 1926.

Sexual selection-effects on feather structure. Rensch, B. 1927b.

EXCREMENT

See also under **Biochemistry**: Chemical composition of excrement.

Chemical composition of feces. *Gallus*. Vauquelin, L. N. 1799. *Struthio*. Vauquelin, L. N. 1810.

Enclosing envelope for feces of nestling birds. Stamati, G. 1888b.

GUANO

Deposits of bird excrement usually on oceanic islands, and more or less ancient.

General. Anderson, T. 1851a, b, 1853a, b, 1857a, b, 1861, 1863, 1865a, b, c, 1873; Barral, J. A. 1874; Baudrimont, A. E. 1867a, b, 1873; Chevreul, M. E. 1873b, c, 1883a; Clark, John 1882; Coker, R. E. 1908, 1919; Forbes, H. O. 1913; Fyfe, W. W. 1866; Girardin, J. 1865, 1866; Gronen, D. 1889; Habel, A. 1875; Janisch, C. 1861; Jean, F. 1875; Julien, A. A. 1863; Kneeland, S. 1881; Raimondi, A. 1856; Ridgway, R. 1893a; Wöhler, F. 1841.

Ammonium carbonate and potassium sulphate in guano. Chevreul, M. E. 1883b.

Chemical composition of guano. Baudrimont, A. E. 1867b.

Guano from islands off coast of Peru. Murphy, R. C. 1920, 1924b, 1926, 1927. Book. Text in English. Murphy, R. C. 1925.

Loss of nitrogen from chicken droppings during drying. Buckner, G. D. & Peter, A. M. 1926.

Presence of "Acide avique." Chevreul, M. E. 1873a.

EXTINCTION

Publications dealing with the extinction of species.

Books. Text in English. Oliver, W. R. 1930; Ralfe, P. G. 1905; Rothschild, L. W. 1907a; Strickland, H. E. & Melville, A. G. 1848; Wallace, A. R. 1876.

Text in German. *Plautus impennis*. Hantzsch, B. 1905.

General. Hagen, H. A. 1861; Hartlaub, C. J. 1898; Renshaw, G. 1937; *Rothschild, L. W. 1907b. Includes birds. Schillings, C. G. 1914.

Conurus carolinensis. Hasbrouck, E. M. 1891. *Didus*. Pictures. Wood, C. A. 1927. *Ectopistes migratorius*. Dury, C. 1910b; Hodge, C. F. 1911, 1912. *Tympanuchus c. cupido*. Gross, A. O. 1923a.

Danger of extinction. *Campephilus*. Hasbrouck, E. M. 1891. Some species of Charadriodea. McAtee, W. L. 1911f. *Columba f. fasciata*. Grinnell, J. 1913.

EXTINCT SPECIES OF VARIOUS REGIONS

Books. Text in English. British Empire. Owen, R. 1879. Bourbon, Mauritius, and Rodriguez Islands. Strickland, H. E. & Melville, A. G. 1848. Denmark. *Haliaeetus albicilla*. Skovgaard, P. 1927a. Island of Mauritius. Milne-Edwards, A. 1872. New Zealand. Oliver, W. R. 1930. North America. Includes birds. Shufeldt, R. W. 1915e. United States. Game birds. Leopold, A. 1931. *Struthioniformes*. Shufeldt, R. W. 1913a.

History and anatomy of extinct species. *Plautus impennis*. Lucas, F. A. 1890.

EYE

This section includes publications primarily morphological or descriptive. For intrinsic muscles of the eye see under *Myology*, for physiology see under *Vision*, for abnormalities see under *Teratology*, and for diseases see under *Pathology*.

Books. Text in Dutch. Leeuwenhoek, A. 1684.

Text in English. Bielezky, N. F. 1880; Leeuwenhoek, A. 1816; Owen, R. 1866-68; Wood, C. A. 1914. Many species. Wood, C. A. 1917. *Speotylo*. Wood, C. A. 1919.

Text in German. Froriep, A. 1905; *Kessler, L. 1877; Meves, W. 1911; Pütter, A. 1912; Treviranus, G. R. 1828; Vogt, C. C. & Yung, E. 1888-94. Many species. Gadow, H. F. 1891d. *Anas*. Budge, J. 1855; Faber, C. 1876. *Anser*. Budge, J. 1855. *Columba*. Krause, R. 1922. *Cypselus*. Faber, C. 1876. *Falco*. Müller, H. 1872b. *Fringilla*. Faber, C. 1876.

Text in Latin. Soemmerring, D. W. 1818. *Meleagris*. Schlemm, F. 1834.

General. Haller, A. 1768a; Hosch, F. 1876; Jeffries, B. J. 1869; Kolmer, W. A. 1924a; Lee, R. J. 1872a, b; Malacarne, V. 1782; Müller, J. P. 1841; Wood, C. A. 1907. Include birds. Haller, A. 1768a; Klingelhöffer, W. 1910; Petit, F. 1728.

Aeronautes. Marshall, M. E. 1907. *Aptenodytes patagonica*. Reid, J. 1835. *Apteryx*. Dareste, C. 1856b. *Aquila*. Rochon-Duvigneaud, A. D. 1919b. *Athene noctua*. Richard, A. 1917.

Bubo. Marshall, M. E. 1907. *Cathartes*. Smith, P. 1795. Includes *Columba*. Gudden, B. 1870. *Colymbus*, *Corvus*, & *Cuculus*. Wolf, J. 1800b. *Dromaeus* [*Dromiceius*]. Knox, R. 1832. *Falco*. Wolf, J. 1800b. *Falcones*. Yarell, W. 1828b. Includes *Gallus*. Kallius, E. 1909. *Geococcyx*. Marshall, M. E. 1907. *Meleagris*. Petit, F. 1738; Smith, P. 1795. *Oriolus* & *Picus*. Wolf, J. 1800b. *Steatornis caripensis*. Müller, J. P. 1842a. *Strigidae*. Franz, V. 1907; Duverney, J. G. 1733f. *Strix*. Wolf, J. 1800b. Includes *Strix*. Schnaudigel, O. 1903. *Struthio*. Duverney, J. G. & Méry, J. 1733; Sloane, H. 1724.

Bilateral symmetry. Includes *Gallus*. Rabl, C. 1917.

"Eye shine." Bergtold, W. H. 1916b; van Rossem, A. J. 1927.

Form. Includes birds. Franz, V. 1913a.

Loss of pigment. Loos, C. 1911a.

Measurements of eyeball. Lee, R. J. 1872a, b; Stejneger, L. H. 1886b. *Alca*. Ischreyt, G. 1913. *Anas*. Ischreyt, G. 1912. *Colymbus*. Ischreyt, G. 1913. *Dafila* & *Fuligula*. Ischreyt, G. 1912. *Gavia*. Ischreyt, G. 1913. *Spatula*. Ischreyt, G. 1912. Books. Text in German. Saemisch, T. & Graefe, A. 1910, p. 178. European birds. Meves, W. 1911.

Optical structure. *Corvus*, *Falco*, & *Strix*. Matthieson, L. 1885, 1891.

Periorbital fascia. *Anser*, *Corvus*, *Gallus*, & *Meleagris*. Barkard, O. 1902.

Popular general description of bird eye. Coues, E. B. 1868-69.

Position in head. Includes *Gallus*. Rabl, C. 1917.

Refraction. Jeffries, B. J. 1869. *Gallus*. Freytag, G. 1909.

Anatomy

Books. Text in German. Many species. Pütter, A. 1912. Includes birds. Burger, J. 1833.

General. Albers, J. A. 1800a; Barkard, O. 1902; *Franz, V. 1909a, b; *Kajikawa, J. 1923; Lee, R. J. 1872a; Leplat, G. 1911, 1912a; Rochon-Duvigneaud, A. D. 1921; Schmidt, P. 1797. Includes birds. Motais, E. 1905. Birds incidental. Carrière, J. W. 1885.

Alca. Ischreyt, G. 1913. *Alcedo a. attis*. Kolmer, W. A. 1924a, c. *Anas*. Ischreyt, G. 1912. *Anser*. Home, E. 1796. *Aptenodytes*. Lee, R. J. 1872b. *Athene*, *Buteo*, & *Columba*. Abelsdorff, G. & Wessely, K. 1909; Pflugk, A. 1906; Waele, H. 1901. *Colymbus*. Ischreyt, G. 1913. *Cygnus*. Soemmerring, D. W. 1818. *Dafila*. Ischreyt, G. 1912. *Eudypetes chrysocome*. Parreidt, R. 1901. *Falcones*. Soemmerring, D. W. 1818. *Fuligula*. Ischreyt, G. 1912. *Gallus*. Abelsdorff, G. & Wessely, K. 1909; Lauber, H. 1902; Waele, H. 1901. *Gavia*. Ischreyt, G. 1913. *Gyps*. Lauber, H. 1902. *Meleagris*. Home, E. 1796. *Milvus* & *Otus*. Abelsdorff, G. & Wessely, K. 1909. *Passer*. *Slonaker, J. R. 1918; Waele, H. 1901. *Phoenicopterus*. Lee, R. J. 1872b. *Psittaci*. Soemmerring, D. W. 1818. *Rhea*. Lee, R. J. 1872b. *Spatula*. Ischreyt, G. 1912. *Striges*. Home, E. 1796; Soemmerring, D. W. 1818. *Strigiformes*. Koenig, E. 1685. *Strix*. Abelsdorff, G. & Wessely, K. 1909. *Struthio*. Duverney, J. G. & Méry, J. 1738; Soemmerring, D. W. 1818. *Syrnium*. Abelsdorff, G. & Wessely, K. 1909; Lauber, H. 1902.

Anterior half. Posterior view. Colored plates. *Columba*, *Falco*, *Gallus*, & *Otus*. Hess, C. 1909a. *Phalacrocorax*. Hess, C. 1910b.

Aqueous humor. *Strix bubo*. Rochon-Duvigneaud, A. D. & Mawas, J. 1922.

Dissection of eye figured. *Struthio*. Stibbe, E. P. 1928.

Fundus. Ophthalmoscope observations of fundus. Many species. Books. Text in English. *Wood, C. A. 1917. *Speotyto*. Wood, C. A. 1919.

Lymphatic vessels of eye. *Strigidae*. Wagner, R. 1833a. Birds incidental. Hamburger, C. 1914.

Sections of eye figured. Hachet-Souplet, P. 1902.

Anterior portion

General. Includes birds. Lauber, H. 1902.

Anterior chamber angle. *Gallus*. Gabriélidès, A. J. 1895.

Development of anterior chamber. Includes *Anas*. Lindahl, C. 1915. Includes *Gallus*. Gabriélidès, A. J. 1895.

Development

Books. Text in German. Many species. Gadow, H. F. 1891d. *Gallus* & *Turdus*. Kessler, L. 1887.

General. Huschke, E. 1831; Leplat, G. 1911, 1912a; Leßer, O. 1911; Real y Beiro, J. D. 1885; Rumshevich, K. O. 1878; Schultze, O. 1893-94. Include birds. Desmoulins, L. A. 1823c; Froriep, A. 1905; Huschke, E. 1832b; Szily, A. 1921. Birds incidental. Studnička, F. K. 1913.

Anas. *Lindahl, C. & Jokl, A. 1922. *Columba*. Lieberkühn, N. 1872. *Gallus*. Ammon, F. A. 1833; Babuchin, A. I. 1863; Gray, H. 1850; Gurwitsch, A. 1910; *Kessler, L. 1871; Lieberkühn, N. 1872, 1879; *Lindahl, C. & Jokl, A. 1922; Mann, I. C. 1920-21; Oken, L. & Kieser, D. G. 1807; Rabaud, E. 1901c; Reverberi, G. 1929; Schoeler, H. 1849; *Szily, A. 1922. Includes *Gallus*. Lenhossék, M. 1896. *Passer*. *Lindahl, C. & Jokl, A. 1922; *Slonaker, J. R. 1921. *Podiceps*. *Lindahl, C. & Jokl, A. 1922.

Choroid fissure. Includes *Gallus*. Assheton, R. 1893.

Embryo grafts, development. *Gallus*. Hoadley, L. 1926a.

Tissue culture, development. Strangeways, T. S. & Fell, H. B. 1926.

Wandering pigment cells of ectoderm, origin. *Gallus*. Lewis, W. H. 1903.

Histology

Book. Text in German. *Columba*. Krause, R. 1922.

General. Includes birds. Franz, V. 1924. Leydig, F. 1854a.

Elastic tissue. Carlier, E. 1904, 1905.

Physiology

Book. Text in English. Bieletzky, N. F. 1880.

General. *Kajikawa, J. 1923; Lee, R. J. 1872a. Include birds. Franz, V. 1913a; Motais, E. 1905. *Alcedo attis*. Kolmer, W. A. 1924c. *Athene*, *Buteo*, *Columba*, *Gallus*, *Milvus*, & *Otus*. Abelsdorff, G. & Wessely, K. 1909. *Passer*. *Slonaker, J. R. 1918. *Strix* & *Syrnium*. Abelsdorff, G. & Wessely, K. 1909.

Eye movements from thermal stimulation of N. acusticus. Includes *Columba*. Kubo, I. 1906.

Nictitating membrane. Speed of movement. Dunlap, K. & Mowrer, O. H. 1930.

Nystagmus. Many species. Ewald, J. R. 1908.

Physiology of intrinsic muscles. Hüttenbrenner, A. 1868.

Regeneration in embryo. Experimental studies. *Gallus*. Barfurth, D. & Dragendorff, O. 1902; Dragendorff, O. 1903.

Sensitivity to light and adaptation. *Gallus*. *Honigsmann, H. 1921.

ACCOMMODATION IN FOCUS

General. *Beer, T. 1893; Franz, V. 1909b; Hess, C. 1909a, b; Jeffries, B. J. 1869; Leplat, G. 1912a; Müller, H. 1857b.

Bubo. Lee, R. J. 1872a. *Columba*. Exner, S. 1882; *Hess, C. 1909a; Jegorow, J. 1887b, 1890. *Gallus*. *Hess, C. 1909a. *Goura* & *Neophron*. Lee, R. J. 1872a. *Phalacrocorax*. *Hess, C. 1910b.

Action of Crampton's muscle in accommodation. Brücke, E. W. 1846, 1847; Hüttenbrenner, A. 1868; Rouget, C. 1856. *Bubo*, *Columba*, & *Gallus*. Exner, S. 1882.

Effect of accommodation on ocular tension. Includes *Columba*. Hess, C. 1911c.

Ocular pressure effects. Includes *Columba*. Hess, C. 1909b.

Pharmacologic studies of accommodation. *Columba*. Heine, L. 1898.

PHYSIOLOGY OF IRIS

Book. Text in German. Anatidae. Budge, J. 1855.

General. Hüttenbrenner, A. 1868. Many species. Nepveu, A. 1907a, b; Steinach, E. 1890. Include birds. Hess, C. 1907c; Rouget, C. 1856; Weber, E. H. 1821. Anatidae. *Zeglinski, N. 1885. *Columba*. Hess, C. 1915; Kschischkowski, C. 1911; *Zeglinski, N. 1885. *Columba* incidental. Langendorff, O. 1894. Includes *Columba*. Grünhagen, A. W. 1864. *Gallus*. *Zeglinski, N. 1885. *Otus*. Hess, C. 1915.

Graphs of pupillary changes. Kaiser, L. 1921-22.

Role of sympathetic innervation in size of pupil. Grünhagen, A. W. 1887.

Says iris and eyelids are not innervated by sympathetic nervous system. *Columba*, *Gallus*, & *Meleagris*. Jegorow, J. 1887b, 1890.

Pupillary reflexes

General. Includes birds. Hess, C. 1907a. *Columba*. Hess, C. 1915; Noll, A. 1925. *Gallus*. Noll, A. 1925. *Otus*. Hess, C. 1915.

Decerebrate bird. *Columba*. Noll, A. 1915.

Diurnal and nocturnal birds compared. Hess, C. 1908b.

Effect of light, cold, and heat on pupillary reflexes. Include *Columba*. Brown-Séquard, C. E. 1847, 1859.

Pharmacologic studies. Includes birds. Ehrhardt, P. 1890. *Columba*. Hayama, K. 1927; Meyer, H. H. 1893.

PHYSIOLOGY OF RETINA

General. *Carine n. noctua* & *Columba*. Kohlrausch, A. & Brossa, A. 1914a, b; Schüpbach, P. 1905; *Schultze, M. 1866. *Falco*, *Gallus*, & Strigidae. *Schultze, M. 1866.

Action current with brief light and dark stimulation. Includes *Columba*. Piper, H. 1910.

Double fovea in retina. *Chelidon*, *Hirundo*, & *Sula*. Portier, P. 1923a.

Effect of light adaptation on structure of nerve cells in retina. *Columba*. Birch-Hirschfeld, A. 1906.

Metabolism of retina at various stages in development. *Gallus*. Tamiya, C. 1927.

ACCOMMODATION APPARATUS

General. *Beer, T. 1893; *Canfield, W. B. 1886b; Ischreyt, C. 1900; Müller, H. 1857b. Include birds. Hess, C. 1909a, b; Schleich, G. 1896; Stilling, J. 1911. Birds incidental. Grynfeldt, E. 1910. *Falco*. Müller, H. 1872b.

Course of nerve fibres in optic tract. Noll, A. 1922.

Ciliary body

General. Leplat, G. 1912a; *Melkich, —. 1895. Colored plates. *Columba*, *Falco*, *Gallus*, & *Otus*. Hess, C. 1909a. *Phalacrocorax*. Hess, C. 1910b.

Development and structure of ciliary body and process. Angelucci, A. 1879, 1880, 1881; *Leplat, G. 1912b.

HISTOLOGY

General. Includes birds. Finkbeiner, F. 1855.

Orbiculus ciliaris. Includes birds. Ammon, A. F. 1832.

Ciliary muscle

General. Beer, T. 1893; Bond, C. J. 1912; Carlier, E. W. 1905; Crampton, W. 1813; Lawson, H. 1869; Lee, R. J. 1873; Leplat, G. 1912a; Méry, J. 1733c; Müller, H. 1857b; Pagenstecher, A. 1860; Rumshevich, K. O. 1876, 1887; Zietzschmann, O. 1906. Many species. Nuel, J. P. & Hosch, F. 1874. Include birds. Knox, R. 1824a; Lee, R. J. 1869; Ziem, C. H. 1891. *Anser*. Home, E. 1796. *Aptenodytes*. Lee, R. J. 1872b. *Bubo* & *Goura*. Lee, R. J. 1872a. *Meleagris*. Home, E. 1796. *Neophron*. Lee, R. J. 1872a. *Phasianus versicolor*. Lawson, H. 1869. *Phoenicopterus* & *Rhea*. Lee, R. J. 1872b.

Brücke's muscle. Include birds. Jessop, W. H. 1887; Schleich, G. 1896.

Crampton's muscle. Ammon, F. A. 1832; *Beer, T. 1893; Brücke, E. W. 1846, 1847; Crampton, W. 1813; Donders, F. C. 1854; Franz, V. 1909b; Guarini, M. L. 1845; Harting, P. 1868; Jeffries, B. J. 1869; Jessop, W. H. 1887; Leplat, G. 1912a; Müller, H. 1857b; Yarrell, W. 1928b. *Bubo*, *Columba*, & *Gallus*. Exner, S. 1882.

Development and structure. *Leplat, G. 1912b. Includes *Gallus*, *Halmahera*, & *Strix*. Herzog, H. 1902.

Innervation. Boeke, J. 1916b. Include birds. Boeke, J. 1916a; *Geberg, A. 1884.

Müller's muscle. Franz, V. 1909b. Includes birds. Jessop, W. H. 1887.

BLOOD VESSELS

General. Kijowska, W. 1926. *Numida*. Beauregard, H. 1878.

Blood supply of posterior chamber. *Beauregard, H. 1876b.

Development and distribution of blood vessels of eye. *Anas*, *Anser*, *Astur*, & *Scolopax*. Kijowska, W. 1926.

CHOROID LAYER

Color function. Includes *Strix*. Desmoulins, L. A. 1824.

Development. Include birds. Angelucci, A. 1880, 1881.

Histology

Include birds. Angelucci, A. 1880, 1881. *Anas* & *Gallus*. Busacca, A. 1913b.

Layer of striped muscle fibers. *Anas*, *Anser*, *Columba*, *Corvus*, & *Gallus*. Wittich, W. 1853.

PIGMENT OF CHOROID LAYER

General. Heusinger, K. F. 1820.

Development. *Gallus*. Busacca, A. 1913a, c.

CORNEA

General. Includes birds. Falcones. Lightbody, W. H. 1867.

Connection of cornea with sclera. Demours, D. E. 1744.

Cytology. Include *Gallus*. Mawas, J. 1911, 1912.

Development. *Gallus*. Knappe, E. V. 1909; *Laguesse, E. 1923a, b, 1926a, b; Lodijenski, V. 1917. Includes *Gallus*. Wilckens, M. 1861.

Histology

General. *Gallus*. Lodijenski, V. 1915.

Connective tissue. Includes *Columba*. Eloui, M. 1880.

Elastic tissue arrangement. *Columba* & *Gallus*. Lieto-Vollaro, A. 1910a.

Membrane of Descemet. *Anas* & *Columba*. Smirnov, A. E. 1888.

EYE LIDS

Many species. Wood, C. A. 1915. Owl. Duverney, J. G. 1733f.

Development. Includes birds. Doenecke, F. W. 1899. *Passer*. Slonaker, J. R. 1921.

Eye lashes. *Trochilidae*. Coale, H. K. 1913.

Histology. Includes birds. Doenecke, F. W. 1899. *Anas*, *Columba*, *Corvus*, *Gallus*, *Larus*, & *Passer*. *Riehl, H. A. 1908.

Movements. Includes birds. Blount, W. P. 1927.

Palpebral fissure. Includes *Gallus*. Lieberkühn, N. 1873.

GLANDS

Book. Text in German. Many species. Gadow, H. F. 1891d.

General. *Otus*. Petit, F. 1739.

Harder's (nictitating) gland. Giebel, C. G. 1857b.

INNERVATION

See also under *Nervous system*.

Books. Text in German. *Anas* & *Anser*. Budge, J. 1855.

Text in Latin. *Meleagris*. Schlemm, F. 1834.

General. Guarini, L. 1845.

Smooth muscle innervation. Boeke, J. 1915, 1916a, b.

Optic nerve

Book. Text in English. Many species. Wood, C. A. 1917.

Optic nerve papilla, development. *Gallus*. *Szily, A. 1922.

IRIS

Color

Book. Text in German. Meves, W. 1911.

General. Corbin, G. B. 1906; Hodek, E. 1879; Stejneger, L. H. 1886b. *Fuligula*. Bird, M. C. 1906. *Garrulus*. Rivière, B. B. 1923a. *Nyroca*. Dalgliesh, G. 1906. *Pavo*. Finn, F. 1928. *Picidae*. Swenander, G. 1898. Albino birds. Aplin, O. V. 1891; Corbin, G. B. 1891; Ingram, W. J. 1892.

Asymmetrical coloration. *Columba*. Gadeau de Kerville, H. 1888.

Changes in color during first year. *Larus*. Wood, C. A. 1923a.

Sex dimorphism in color. *Cacutia ophthalmica*. Mayer, O. 1928.

Variation in color. *Parus*. Anzinger, F. 1897.

Histology

General. Canfield, W. B. 1886a; *Krohn, A. 1837; *Melkich, —. 1895. Includes birds. *Koganei, J. 1885. *Anas*. *Andreae, A. 1909; Faber, C. 1876. *Buteo*. Michel, J. 1875. *Columba*.

*Andreae, A. 1909; Bajardi, P. 1893. *Cypselus* & *Fringilla*. Faber, C. 1876. *Gallus*. *Andreae, A. 1909; Bajardi, P. 1893; Michel, J. 1875. *Meleagris*. *Andreae, A. 1909. *Strigidae*. Wagner, R. 1833a.

Development. Includes *Gallus*. Angelucci, A. 1880, 1881.

Elastic tissue of iris. Includes *Gallus*. Lieto-Vollaro, A. 1910b.

Innervation of iris. *Geberg, A. 1884. Includes birds. Boeke, J. 1916a.

Ligamentum pectinatum. Herzog, H. 1902. *Columba*, *Corvus*, & *Falco t. tinunculus*. *Wychgram, E. 1912.

Membrane of Bruch. *Columba*. *Wehner, G. 1923. Birds incidental. Grünhagen, A. W. 1888.

Pigment. Relation to hearing. Includes *Anser*. Sichel, J. 1847.

Posterior epithelium of iris. *Noctua*, *Scops*, *Strix*, & *Syrnium*. Grynfeltt, E. 1905a.

Spaces of Fontana. Angelucci, A. 1879; Leplat, G. 1912b.

Musculature

Book. Text in German. *Anas* & *Anser*. Budge, J. 1855.

General. Bond, C. J. 1912; Méry, J. 1733c; Müller, H. 1857b; Pagenstecher, A. 1860; Rumshevich, K. O. 1876, 1887. *Anas*. *Durand, G. 1893b, c. *Anser*. Grünhagen, A. W. 1873; Home, E. 1796. *Columba*. Grünhagen, A. W. 1864. *Gallus*. Durand, G. 1893b, c; Grünhagen, A. W. 1873. *Meleagris*. *Durand, G. 1893b, c; Home, E. 1796. *Strix*. Grünhagen, A. W. 1873; Home, E. 1796. Birds incidental. Grünhagen, A. W. 1888; Keibel, F. 1906; Zietzschmann, O. 1906.

Development of iris muscle. *Gallus*. Collin, R. 1903a; Durand, G. 1893a, b, c; Herzog, H. 1902. Includes *Halmahera* & *Strix*. Herzog, H. 1902.

Dilator muscle of iris. *Dogiel, J. 1869, 1870, 1886; Hüttenbrenner, A. 1868. *Anas* & *Columba*. *Zietzschmann, O. 1909. Includes *Gallus*. Gabriélidès, A. J. 1895.

SPHINCTER MUSCLE

General. Grynfeltt, E. 1905b. *Columba*. Consiglio, M. 1900.

Function. Leplat, G. 1912a.

Development

General. *Gallus*. Collin, R. 1903b.

Origin from ectoderm. *Gallus*.
*Lewis, W. H. 1903.

Pupil

General. Birds incidental. Dugès,
Ant. 1834.

Development. *Anas*, *Gallus*, & *Passer*.
Lindahl, C. 1912.

SIZE CHANGES

Book. Text in German. *Anas* &
Anser. Budge, J. 1855.

General. Many species. Krohn, A.
1837; Steinach, E. 1890. *Anas*, *Buteo*,
Conurus, *Larus*, & *Loxia*. Nepveu, A.
1907a. *Psittacus erithacus*. Schjelderup-
Ebbe, T. 1923b.

Contracts in sunlight to narrow slit.
Rhynchops nigra. Wetmore, A. 1919b.

Drug action. Includes birds. Ehr-
hardt, P. 1890. Includes *Columba* &
Gallus. Koppányi, T. & Sun, K. H.
1926.

LACRIMAL APPARATUS

General. Many species. *Wood,
C. A. 1915. *Passer*. Slonaker, J. R.
1918.

Nasolacrimal duct. Includes birds.
Matys, V. 1906.

LENS

General. Müller, H. 1857b. Includes
birds. Petit, F. 1732. Birds incidental.
Addario, C. 1902; Hannover, A. 1845;
Robinsky, S. 1877.

Development. Haensell, P. 1887;
Kölliker, R. A. 1904; Ritter, K. 1877a.
Includes birds. Angelucci, A. 1879.
Anas. *Rabl, C. 1889b, 1903; Wolfrum,
L. 1907. *Gallus*. Burnett, W. I. 1853a;
Dragendorff, O. 1903; Kessler, L. 1874;
Knape, E. V. 1909; Schaper, A. &
Cohen, C. 1905; Szily, A. 1904. Include
Gallus. Korányi, A. 1886; *Rabl, C.
1889b, 1903; *Szily, A. 1908. Includes
Macroglossus. Kölliker, R. A. 1904.

Folds of amnion in lens invagination.
Embryo. *Gallus*. Szily, A. 1906.

Indices of refraction. *Gallus*. Frey-
tag, G. 1909.

Histology

General. Zernoff, D. 1867. *Anas*.
*Rabl, C. 1889b, 1903; Ritter, K. 1877b.
Includes *Anas*. Wolfrum, L. 1907. *Anser*.
Ritter, K. 1877b. *Columba*. Ritter, K.
1877b, 1900b. *Gallus*. Busacca, A.
1924; *Rabl, C. 1889b, 1903; Ritter, K.
1877b, 1900b; Virchow, H. 1904. In-
cludes *Gallus*. Retzius, M. G. 1894;
Zernoff, D. 1867. *Passer*, *Perdix*, *Stur-
nus*, & *Vanellus*. Ritter, K. 1900b. In-
clude birds. Finkbeiner, F. 1855; Vir-
chow, H. J. 1900, 1904.

Histogenesis of lens. Franz, V.
1912a.

Mitochondria of lens. *Columba* &
Gallus. Maggiore, L. 1911.

Suspensory ligament (Zonula of Zinn)

General. Knox, R. 1824b. *Anas*,
Anser, *Gallus*, *Passer*, & *Perdix*. Ritter,
K. 1900a, 1901. Include *Gallus*.
Retzius, G. 1894; Roud, A. 1913.

Canal of Petit. Knox, R. 1826.

Histogenesis. *Gallus*. Carlini, V.
1912; *Lenhossék, M. 1911b, c.

Histology. Includes birds. Fink-
beiner, F. 1855.

MELANIN PIGMENT

General. *Gallus*. Mays, K. 1879.
Strigidae. Wagner, R. 1833a.

Comparison in pigment epithelium
of white and pigmented varieties. *Streptopelia risoria*. Strong, R. M. 1912c.

Development. Includes *Gallus*. Szily,
A. 1911.

Iris pigment. Troller, J. 1917. *Athene*.
Balducci, E. 1905. Picidae. Swenander,
G. 1898.

Origin and development in pigment
epithelium. *Gallus*. Smith, D. T. 1920.

Post-mortem melanin pigment forma-
tion in pigmentless retinas and choroids.
Streptopelia. *Riddle, O. & La Mer,
V. K. 1918.

MUSCLES, EXTRINSIC

Books. Text in German. *Anas* &
Anser. Budge, J. 1855.

Text in Latin. *Meleagris*. Schlemm,
F. 1834.

General. Include birds. Barkard, O. 1902; Motais, E. 1901; *Rex, H. 1901b. *Anser*. Home, E. 1796. *Bubo*. Bartels, M. & Dennler, G. 1920-21. Includes *Gallus*. Corning, H. K. 1902. *Larus ridibundus*. *Rex, H. 1914. *Meleagris*. Home, E. 1796. *Otus*. Petit, F. 1739. Strigidae. Home, E. 1796. Includes *Sula*. Motais, E. 1905.

Good figures showing eye muscles in orbit. Includes birds. Motais, E. 1905.

Development. *Gallus*. Adelman, H. B. 1927. Birds incidental. Nussbaum, M. 1899.

Insertions in orbit. Kaiser, L. 1921-22.

Superior oblique muscle, development. *Larus*. *Rex, H. 1924.

NICTITATING MEMBRANE

General. Maynard, C. J. 1889a. Includes birds. Stibbe, E. P. 1927.

Function

General. Bert, P. 1885. *Columba*. Friedmann, H. 1932b.

Use in clearing eye of water. *Cinclus*. Cordier, A. H. 1927.

Histology

General. *Columba* & *Gallus*. Fumagalli, A. 1899.

Feathered epithelium. *Columba*. Kolmer, W. A. 1923.

ORBIT

Orbital sinus. Development. *Fringilla* & *Gallus*. *Aulmann, G. 1909.

Periorbital fascia. *Anser*, *Corvus*, *Gallus*, & *Meleagris*. Barkard, O. 1902.

Structure. Barkard, O. 1902.

PECTEN

Etymological criticism of term. Blochmann, F. 1925.

Books. Text in English. Many species. Wood, C. A. 1917.

Text in German. *Falco*. Müller, H. 1872b.

General. *Beauregard, H. 1876b; Franz, V. 1910b, 1912a; Fricker, —, 1838; Giebel, C. G. 1857b; Home, E. 1796; Knox, R. 1824b; Kolmer, W. A. 1924a; La Hire, P. 1699; Schleich, G.

1896; Virchow, H. J. 1885, 1900. Many species. Wagner, R. 1837; Ziem, C. H. 1896. Includes birds. Knox, R. 1826.

Anas. Bert, P. & Boucheron, A. H. 1876. *Columba*. Ziem, C. H. 1891. *Gallus*. André, J. & Beauregard, H. 1874; Beauregard, H. 1875; Bert, P. & Boucheron, A. H. 1876; Huschke, E. 1827a; Ziem, C. H. 1891. Include *Gallus*. Kallius, E. 1909; Lieberkühn, N. 1873. *Passer*. Slonaker, J. R. 1918.

Blood supply. Kijowska, W. 1926.

Development. *Husen, E. 1913; Parreidt, R. 1901; Zuckermann-Zichova, M. 1921. Many species. Pasquini, P. 1925a, 1926a. *Anas*. Lindahl, C. & Jokl, A. 1922. *Gallus*. Bernd, A. H. 1905; Lindahl, C. & Jokl, A. 1922; Mann, I. C. 1924; *Mihálikovics, G. V. 1873a, b; Pasquini, P. 1925b; Szily, A. 1922. Book. Text in German. Oken, L. & Kieser, D. G. 1807. *Passer* & *Podiceps*. Lindahl, C. & Jokl, A. 1922.

Function. Abelsdorff, G. 1910; Blochmann, F. & Husen, E. 1911; Dennissenko, G. 1881b; Fieuzal, J. M. 1875; Franz, V. 1908, 1909b, 1910b; Husen, E. 1913; Kusakawa, M. 1925; Mawas, J. 1913; *Thomson, A. 1929. Many species. Ziem, C. H. 1896. *Gallus*. Mann, I. C. 1924; Pasquini, P. 1926b.

Histology. Dennissenko, G. 1881b; Franz, V. 1908; *Husen, E. 1913; Kusakawa, M. 1925; Mawas, J. 1913. Many species. Ziem, C. H. 1896. *Gallus*. Mann, I. C. 1924; Pasquini, P. 1926b.

Light dispersion on surface. Anatomical explanation. Chatin, J. 1880.

Nutrition. *Gallus*. Mann, I. C. 1924.

Optical properties. *Gallus*. Mann, I. C. 1924.

RETINA

Books. Text in English. Many species. Wood, C. A. 1917. *Speotyto*. Wood, C. A. 1919.

General. Kolmer, W. A. 1924a; *Krause, W. 1894; Ramón y Cajal, S. 1888.

Include birds. Hannover, A. 1840; Knox, R. 1824b; Müller, H. 1854, 1862. *Anas*. *Ritter, K. 1891; Rjesnikow, C. 1897. *Charadrius*. *Ritter,

K. 1891. *Columba*. Kohlrausch, A. 1914; Kohlrausch, A. & Brossa, A. 1914b; Müller, H. 1872a; *Pacini, F. 1845. Includes *Columba*. Müller, H. 1857a. *Corvus*. *Ritter, K. 1891. Falconiformes. Portier, P. 1923b. *Gallus*. *Pacini, F. 1845; Rjesnikow, C. 1897. *Passer*. *Pacini, F. 1845; *Ritter, K. 1891. *Perdix*. *Ritter, K. 1891. Strigidae. Kühne, W. 1882. Strigiformes. Kohlrausch, A. & Brossa, A. 1914b.

Development. *Gallus*. Cameron, J. 1902; Gray, H. 1850; Koganei, J. 1884; Weyssse, A. W. & Burgess, W. S. 1906.

Glycogen occurrence. Includes *Columba*. Brammertz, W. 1914.

Pars ciliaris. *Columba*, *Gallus*, & *Phasianus*. Nussbaum, M. 1901a.

Relations between extent of surface of retina and diameter of optic nerve. Correlation with volume of optic lobes. Book. Text in French. Desmoulins, L. A. 1823b.

Histology

Book. Text in German. Includes *Gallus*. Ramón y Cajal, S. 1894, pp. 101-112.

General. *Dogiel, A. S. 1895a, b; Hoffmann, C. K. 1877; Ramón y Cajal, S. 1888, 1896; Tafani, A. 1878. Many species. Hoffmann, C. K. 1877. Includes birds. Cattaneo, D. 1922; Dennissenko, G. 1881a; Pacini, F. 1845.

Anas. Waelchli, G. 1881, 1883. *Bubo*. Franz, V. 1910a. *Columba*. *Schultze, M. 1866; Waelchli, G. 1881, 1883. *Falco*. *Schultze, M. 1866. *Fringilla*. Hoffmann, C. K. 1877; Waelchli, G. 1881, 1883. *Gallus*. Hoffmann, C. K. 1877; *Schultze, M. 1866; Van der Stricht, O. 1922; Waelchli, G. 1881, 1883. Includes *Gallus*. Mann, I. C. 1928; *Ramón y Cajal, S. 1893. *Otus*. Franz, V. 1910a. Strigidae. *Schultze, M. 1866. *Uria*. Franz, V. 1910a.

Connective tissue elements of retina. Heinemann, C. 1864.

Epithelial rests in retina and optic nerves. Ucke, A. J. 1891a.

Morphological changes in retina produced by light. Include birds. Chiarini, P. 1906, 1907. *Phalacrocorax*. Carlson, A. J. 1903.

Spongioblasts of retina. *Gallus*. Coi-duras, B. 1904.

NERVOUS ELEMENTS

General. Include *Columbae* and Strigidae. Dogiel, A. S. 1888a, b, 1895b.

Ganglion cells. Schüpbach, P. 1905. Includes *Columba*. Oshinomi, T. 1930.

Nerve endings. Strigidae. Wagner, R. 1833a.

Neurofibrillae. Includes *Gallus*. Uyama, Y. 1926.

Optic nerve, insertion. *Anas*, *Gallus*, *Passer*, & *Podiceps*. Lindahl, C. & Jokl, A. 1922.

NEURONS

General. Bouin, P. 1895. *Anas*, *Passer*, Strigidae, etc. Ramón y Cajal, S. 1889b.

Neuron connections. Includes *Columba*. Bouin, P. 1894.

PIGMENT

General. Kühne, W. 1878.

Visual purple. *Columba* & *Gallus*. Hess, C. 1907b.

Yellow pigment. Schultze, M. 1866.

Pigment epithelium

General. Hess, C. 1910a. Includes *Columba*. Angelucci, A. 1878a. *Gallus*. Smith, D. T. 1920. Includes *Gallus*. Luna, E. 1913. *Strix*. Angelucci, A. 1878b.

Development. Includes *Gallus*. Ucke, A. J. 1891b.

Migration of pigment included. Hess, C. 1910a.

Pigment formation in embryo. *Gallus*. Uyama, Y. 1922.

RODS AND CONES

General. *Columba*. Leplat, G. 1914. *Falco*. *Schultze, M. 1867. *Fringilla*. Talma, S. 1873. *Gallus*. *Schultze, M. 1867. Birds incidental. Hesse, R. 1904.

Development. *Gallus*. Leplat, G. 1914; Ohashi, Y. 1923.

Oil globules

General. Hahn, E. 1917.

Significance of red oil globules. *Columba*, *Gallus*, & *Meleagris*. Henning, H. 1920.

Spectral analysis of red oil globules. Engelmann, T. W. 1880-81.

Macula lutea

General. *Parus*. Stübler, H. 1916.

FOVEA CENTRALIS

General. Chievitz, J. H. 1890a, b, 1892. Many species. Müller, H. 1872a.

Development. *Corvus*. Chievitz, J. H. 1888.

Occurrence of two foveae. Müller, H. 1863. *Chelidon*. Portier, P. 1923a. *Columba* & *Corvus*. *Fritsch, G. 1911. *Hirundo*. Portier, P. 1923a. *Sterna*. Fritsch, G. 1914. *Strix*. *Fritsch, G. 1911.

Position shown in diagrammatic figures of skull. Many species. *Rochon-Duvigneaud, A. 1919c.

Structure. *Fringilla*. Chievitz, J. H. 1890a.

SCLERA

General. Includes *Anser*, *Columba*, *Passer*, & *Spinus*. Wedl, C. 1848.

Histology and development. *Gallus*. Pes, O. 1909.

Papillae of conjunctiva sclerae in embryo. *Gallus*. Nussbaum, M. 1901c.

Sinus venosus sclerae (Canal of Schlemm). Includes birds. Angelucci, A. 1879.

Sclerotic rings

General. Allis, T. 1838b, c, 1855; Giebel, C. G. 1857b; Home, E. 1796; Leydig, F. 1855; Méry, J. 1733a. *Aquila* & *Corvus*. Méry, J. 1733d. Phasianidae. Chatin, J. 1910. *Podargus*. Allis, T. 1837. *Struthio*. Méry, J. 1733d.

Bony plates in sclerotic ring. Blumenbach, J. F. 1798; Gemminger, M. 1853. *Aquila*. Gerard, C. 1828.

Development of sclerotic ring. Includes *Gallus*. Dabelow, A. 1926.

Osseous plate in sclera surrounding entrance of optic nerve. *Corvus*. Shufeldt, R. W. 1888g.

Phylogeny of sclerotic ring. Includes *Gallus*. Dabelow, A. 1926.

VITREOUS BODY

General. *Columba* & *Gallus*. Beaugard, H. 1880.

Development. Includes birds. Ciacio, G. V. 1877-78.

FALCONRY

Publications dealing with the ancient sport of using trained hawks to capture birds.

Books. Text in English. Allen, G. M. 1925; Barnes, or Bernes, J. 1810; Bert, E. 1619; Burton, R. F. 1852; Grindal, W. 1596; Gurney, J. H., Jr. 1921; Harting, J. E. 1891a, c, 1898; Macpherson, H. A. 1897a; Markham, G. 1597; Nelson, W. 1732; Phillott, D. C. 1908; Salvin, F. H. & Brodrick, W. 1873.

Text in French. Chenu, J. C. & Des Murs, M. A. 1862; Schlegel, H. & Verster de Wulverhorst, A. H. 1844-53.

Text in German. Landau, G. 1849; Riedinger, M. E. 1767.

Text in Italian. Carcano, F. 1645; Giorgio, F. 1645; Olina, G. P. 1684; Tuano, J. A. 1735.

Text in Latin. *Friedrich II 1596.

General. Goodwin, G. G. 1929; Haskins, C. H. 1921; Klunzinger, C. B. 1903a; Yoshida, Y. 1932; Ziembicki, W. 1927.

FAUNA

Arrangement based largely on the Century Atlas of the World. Political divisions are mainly as they existed prior to 1914. This section is limited to the larger publications on the subject, and not all of these have been included. The aim has been to present a useful bibliography covering the bird fauna of the world fairly completely.

Altitude and latitude factors. Allen, J. A. 1875.

Change in distribution. *Zonotrichia*. Cahn, A. R. 1915b.

Decrease in certain species. New England. Forbush, E. H. 1905a, b, 1908b.

Dispersal over new area. Lewis, H. F. 1927b.

Extension of range. *Sturnus*. Hicks, L. E. 1933b.

High altitudes. Krohn, H. 1916.

Influence of rainfall. Hume, A. O. 1878a, b.

Land birds at sea. Compsothlypidae. Penard, T. E. 1926.

Origin of American fauna. Lönnberg, A. J. 1927b. Includes birds. Book. Text in English. Scharff, R. F. 1911.

Role of "accidental" in lists of birds for a region. Grinnell, J. 1922a.

CHANGES DUE TO

Climatic changes. Lönnberg, A. J. 1929d.

Civilization. Braun, F. 1913b.

Experimental changes in flora. Longstaff, T. G. 1926.

Flora change. Migratory birds. Braun, F. 1904.

Geological cause. Leaving New Jersey. *Mimus p. polyglottos*. Lockwood, S. 1892.

Irrigation. Bailey, F. A. 1910a.

Roadways. Linsdale, J. M. 1929.

INTRODUCTION OF EXOTIC SPECIES

General. Wolford, H. L. 1854. *Alauda arvensis*. Gorgas, J. 1854. *Passer*. Townsend, C. W. & Hardy, J. H. 1909. *Sturnus vulgaris*. Cooke, M. T. 1925; Hicks, L. E. 1933b.

Game birds suitable for introduction. McAtee, W. L. 1929b.

Naturalization. Includes birds. Book. Text in English. Thomson, G. M. 1922.

Birds of the world

Books. Text in English. Evans, A. H. 1909; Knowlton, F. H. 1909; Latham, J. 1781-1802, 1790.

Text in French. Bonnaterre, P. J. & Vieillot, L. P. 1923. Includes birds. Du Petit-Thouars, A. A. 1846-55.

Text in German. Reichenow, A. 1913.

Text in Japanese. Anatidae of world. Kuroda, N. 1912, 1913.

General. Nicoll, M. J. 1904b.

CHECK LISTS

See also under **Taxonomy**.

Books. Text in English. Gray, G. R. 1844-49, 1869-71; Sharpe, R. B. & others 1874-98; Sherborn, C. D. 1902-33; Wytsman, P. A. 1905-14.

Text in German. Giebel, C. G. 1872-77.

Islands

Islands not assigned to continents, Oceanica, or polar regions.

Indian Ocean. Kerguelen Island. Hutton, F. W. 1865; Kidder, J. H. 1875; Verrill, G. E. 1895. Mauritius. Meinertzhagen, R. 1912. Prince Edward Islands. Hutton, F. W. 1865.

ATLANTIC OCEAN

North Atlantic Ocean

Bermuda Islands. Bangs, O. & Bradlee, T. S. 1901; Kennedy, J. N. 1914; Martens, E. 1859; Plath, K. 1914.

South Atlantic Ocean

Gough Island. Clarke, W. E. 1905b; Verrill, G. E. 1895.

South Georgia Islands. Lönnberg, A. J. 1906a; Murphy, R. C. 1915c, 1916; Szielasko, A. E. 1907; Verrill, G. E. 1895.

Tristan da Cunha Islands. Lowe, P. R. 1923.

PACIFIC OCEAN

North Pacific Ocean

Clipperton Island. Gifford, E. W. 1913; Snodgrass, R. E. & Heller, E. 1902.

South Pacific Ocean

Easter and Juan Fernandez Islands. Skottsberg, C. J. 1920-31.

Oceans

Book. Text in English. Alexander, W. B. 1928.

General. Nicoll, M. J. 1904b; Paessler, R. 1913.

Arctic Ocean. Snyder, L. L. 1926. Book. Text in English. Schaanning, H. T. 1928.

Indian Ocean. Hutton, F. W. 1865; Vanhöffen, E. 1905.

ANTARCTIC OCEAN

Text in English. Sharpe, R. B. 1902a.

Text in French. Ménégau, H. A. 1907a.

General. Murphy, R. C. 1928; Vanhöffen, E. 1905.

Weddell Sea and adjacent seas. Clarke, W. E. 1905b.

NORTH ATLANTIC OCEAN

General. Helms, O. 1899; Hutt, F. B. 1932; Jespersen, P. 1924, 1925; Kennedy, J. N. 1917b; Wynne-Edwards, V. C. 1935b.

Caribbean Sea. Lowe, P. R. 1909b.

South Atlantic Ocean. Vanhöffen, E. 1905; Wilkins, G. H. 1923.

PACIFIC OCEAN

Northeast Pacific Ocean. Procelariidae. Mathews, G. M. 1915.

South Pacific Ocean. Belcher, C. F. 1913.

Palaearctic Region

Books. Text in English. Dresser, H. E. 1902-03.

Text in German. Hartert, E. J. 1903-22; Sievertsov, N. A. 1921.

General. Moreau, R. E. & Moreau, W. M. 1928; Steinbacher, F. 1929; Sushkin, P. P. 1925b.

American representative of a Palae-arctic group. *Hesperiphona vespertina*. Sushkin, P. P. 1925a.

Polar regions

ANTARCTIC REGION

Books. Text in English. Lowe, P. R. & Kinnear, N. B. 1930; Mathews, G. M. 1928; Sharpe, R. B. 1902a.

Text in French. Anthony, R. L. 1907; Ménégau, H. A. 1907a.

General. Murphy, R. C. 1928; Siple, P. A. & Lindsey, A. A. 1937; Vanhöffen, E. 1905. Sphenisciformes. Gain, L. 1913.

South Orkney Islands. Clarke, W. E. 1905b. *Sula*. Gurney, J. H., Jr. 1914d.

ARCTIC REGION

Arctic North America. Book. Text in Norwegian. Schaanning, H. T. 1933a.

Bear Island. Jourdain, F. C. 1922a; Paget-Wilkes, A. H. 1922; Summerhayes, V. S. & Elton, C. S. 1923.

Northeastern Siberia. Book. Text in English. Schaanning, H. T. 1928.

Nova Zembla (Novaya Zemlya). Gillett, G. 1870; Heuglin, M. T. 1872; Jordans, A. 1925.

Spitzbergen. Heuglin, M. T. 1871; Jourdain, F. C. 1922a; Longstaff, T. G. 1924; Malmgren, A. J. 1863; Montague, F. A. 1926; Newton, A. 1865; Paget-Wilkes, A. H. 1922; Schalow, H. 1899; Summerhayes, V. S. & Elton, C. S. 1923; Zedlitz, O. 1911.

Waigats Island. Heuglin, M. T. 1872.

Wrangell Island. Snyder, L. L. 1926.

AFRICA

Arrangement by Rudyerd Boulton, according to classification by Chapin, J. P. 1923. Alphabetization has been subordinated to zoogeographic criteria.

NORTH AFRICA

Book. Text in English. Ramsay, R. G. 1923.

Palae-arctic migrants. Grote, H. 1930.

Algeria

General. Bannerman, D. A. 1921; Gurney, J. H. 1871; Jourdain, F. C. 1915; Koenig, A. F. 1895; Tristram, H. B. 1859b.

Azores Islands

General. Godman, F. D. 1866; Murphy, R. C. 1923a; Murphy, R. C. & Chapin, J. P. 1929.

Canary Islands

Book. Text in English. Bannerman, D. A. 1922b.

General. Bannerman, D. A. 1912a, 1914b, 1919; Gurney, G. H. 1927; Koenig, A. F. 1890; Meade-Waldo, E. G. 1893; Reid, P. S. 1887.

Cape Verde Islands

General. Murphy, R. C. 1924a.

Egypt

Books. Text in English. Meinertzhagen, R. 1930; Shelley, G. E. 1872; Whymper, C. 1909.

Text in German. Berg, B. M. 1924; Cretzschmar, P. J. 1846.

General. Adams, A. L. 1864a; Boyd, A. W. 1917; Brooksbank, F. H. 1925; Cholmley, A. J. 1897; Hartmann, R. 1863, 1864; Heuglin, M. T. 1859, 1860; Koenig, A. F. 1917, 1920, 1926b, 1932; Le Roi, O. 1923; Meinertzhagen, R. 1921b; Moreau, R. E. 1928; Nicoll,

M. J. 1908; Phillips, J. C. 1915b; Raw, W. 1921; Shelley, G. E. 1871; Taylor, E. C. 1867; Zedlitz, O. 1912.

Mummies of birds. Adams, A. L. 1864b; Lortet, L. & Gaillard, C. 1901, 1907.

Madeira Islands

General. Hartwig, W. 1886; Koenig, A. F. 1890; Meinertzhagen, R. 1925c; Ogilvie-Grant, W. R. 1896.

Morocco

General. Drake, C. F. 1869; Lynes, H. 1920, 1933; Meade-Waldo, E. G. 1903; Tristram, H. B. 1859b.

Sahara Desert

See also under Sudanese Arid District.

General. Balsac, H. 1926; Geyr von Schweppenbourg, H. 1918.

Tunis

Book. Text in English. Whitaker, J. I. 1905.

General. Bannerman, D. A. 1921; Erlanger, C. 1898; Koenig, A. F. 1888; Tristram, H. B. 1859b; Whitaker, J. I. 1894, 1897; Zedlitz, O. 1909.

Ethiopian Region

Books. Text in English. Shelley, G. E. & Sclater, W. L. 1896-1912.

Text in French. Levaillant, F. 1799-1808.

Text in German. Reichenow, A. 1900-05, 1918.

Broadbills. Lowe, P. R. 1931.
Hornbills. Book. Text in English. Elliot, D. G. 1877-82. Pigeons. Shelley, G. E. 1883. Sand grouse. Elliot, D. G. 1878b. Sunbirds. Book. Text in English. Shelley, G. E. 1876-80. Thrushes. Book. Text in English. Seebohm, H. & Sharpe, R. B. 1898-1902. Woodpeckers. Hargitt, E. 1883.

Check list. Sclater, W. L. 1924-30.

Migrants. Grote, H. 1930.

Origin of fauna. Lönnberg, A. J. 1929a.

WEST AFRICAN SUBREGION

Books. Text in English. Bannerman, D. A. 1930-36; Bates, G. L. 1930.

General. Bates, G. L. 1931; Hartlaub, C. J. 1861.

Guinean Forest Province

Upper Guinea Forest District

General. Bannerman, D. A. 1912b.

Gold Coast. Alexander, B. 1902; Sharpe, R. B. 1869; Ussher, H. T. 1874.

Ivory Coast. Bannerman, D. A. 1923.

Liberia. Allen, G. M. 1930.

Sierra Leone. Kelsall, H. J. 1914; Kemp, R. 1905; Thompson, W. R. 1925.

Lower Guinea Forest District

Belgian Congo. Chapin, J. P. 1932; Gyldenstolpe, N. C. 1924; Ogilvie-Grant, W. R. 1908b; Shelley, G. E. 1890.

Cameroons. Bannerman, D. A. 1914c; Bannerman, D. A. & Bates, G. L. 1921; Bates, G. L. 1903, 1911, 1927; Ogilvie-Grant, W. R. 1917; Reichenow, A. 1892; Sharpe, R. B. 1904b.

Gabon. Heine, F. 1860.

Guinean Islands. Alexander, B. 1903; Bannerman, D. A. 1914c.

Nigeria. Bannerman, D. A. 1914c, 1922a; Young, J. D. 1931.

Guinean Savanna Province

General. Chapin, J. P. 1932.

Upper Guinea Savanna District

General. Bannerman, D. A. 1912b.

Cameroons. Bannerman, D. A. 1914c; Bannerman, D. A. & Hutson, H. P. 1924.

Dahomey. Reichenow, A. 1897b.

Gambia. Rochebrune, A. T. 1884.

Gold Coast. Alexander, B. 1902; Sharpe, R. B. 1869; Ussher, H. T. 1874.

Ivory Coast. Bannerman, D. A. 1923.

Nigeria. Bannerman, D. A. 1914c, 1922a; Bannerman, D. A. & Hutson, H. P. 1924; Hutson, H. P. & Bannerman, D. A. 1930; Jourdain, F. C. 1935; Young, J. D. 1931.

Sierra Leone. Kelsall, H. J. 1914; Kemp, R. 1905; Thompson, W. R. 1925.

Ubangi Savanna District

Anglo-Egyptian Sudan. Bowen, W. W. 1925, 1926-31.

Cameroons. Bannerman, D. A. & Hutson, H. P. 1924; Bates, G. L. 1927; Grote, H. 1925a; Reichenow, A. 1892.

Southern Congo Savanna District

Angola. Bannerman, D. A. 1912a.

Belgian Congo. Mouritz, G. B. 1914; Neave, S. A. 1910; Ogilvie-Grant, W. R. 1908b; Reichenow, A. 1923.

Northern Rhodesia. Neave, S. A. 1910.

Uganda-Unyoro Savanna District

Belgian Congo. Gyldenstolpe, N. C. 1924; Ogilvie-Grant, W. R. 1908b.

Uganda. Grant, C. H. 1915; Granvik, H. 1923; Gyldenstolpe, N. C. 1924; Jackson, F. J. 1899, 1926; Ogilvie-Grant, W. R. 1905a, 1908b; Seth-Smith, L. M. 1913; Sharpe, R. B. 1891, 1902b, d; Stoneham, H. F. 1926; Van Someren, V. G. 1916.

EAST AND SOUTH AFRICAN SUBREGION

Humid Montane Province

Cameroon Montane District

Cameroons. Bannerman, D. A. 1914c; Bates, G. L. 1931; Reichenow, A. 1892. Books. Text in English. Bannerman, D. A. 1930-36; Bates, G. L. 1930.

Guinean Islands. Alexander, B. 1903; Bannerman, D. A. 1914c; Bates, G. L. 1931; Hartlaub, C. J. 1861. Books. Text in English. Bannerman, D. A. 1930-36; Bates, G. L. 1930.

Eastern Montane District

Belgian Congo. Chapin, J. P. 1932; Gyldenstolpe, N. C. 1924; Lowe, P. R. 1931; Ogilvie-Grant, W. R. 1908b.

Kenya. Bannerman, D. A. 1910a; Dearborn, N. 1909; Granvik, H. 1923; Jackson, F. J. 1899; Meinertzhagen, R. 1921b; Sharpe, R. B. 1891, 1902b. Book. Text in English. Jackson, F. J. 1926.

Nyasaland. Belcher, C. F. 1925; Paget-Wilkes, A. H. 1928; Paget-Wilkes, A. H. & Sladen, A. G. 1930; Roberts, C. C. 1924; Shelley, G. E. 1901a, b. Book. Text in English. Belcher, C. F. 1930.

Tanganyika. Bannerman, D. A. 1910a; Meinertzhagen, R. 1921b; Oberholser, H. C. 1905a. Book. Text in German. Reichenow, A. 1894.

Uganda. Granvik, H. 1923; Gyldenstolpe, N. C. 1924; Jackson, F. J. 1899; Ogilvie-Grant, W. R. 1908b; Sharpe, R. B. 1891, 1902b, d. Book. Text in English. Jackson, F. J. 1926.

Sudanese Province

Anglo-Egyptian Sudan. Bowen, W. W. 1925, 1926-31; Cholmley, A. J. 1897; Heuglin, M. T. 1859, 1860; Lynes, H. 1924; Rothschild, N. C. & Wollaston, A. F. 1902; Slater, W. L. & Mackworth-Praed, C. W. 1918. Books. Text in German. Berg, B. M. 1924; Cretzschmar, P. J. 1846.

British and French West Africa. Bates, G. L. 1931; Hartert, E. J. 1921; Hartlaub, C. J. 1861. Books. Text in English. Bannerman, D. A. 1930-36; Bates, G. L. 1930.

Sudanese Arid District

Anglo-Egyptian Sudan. Hartmann, R. 1863.

Sudanese Savanna District

Anglo-Egyptian Sudan. Koenig, A. F. 1926a; Ogilvie-Grant, W. R. 1902, 1907a; Phillips, J. C. 1914a; Rochebrune, A. T. 1884; Witherby, H. F. 1901.

Cameroons. Bates, G. L. 1927; Reichenow, A. 1892.

Nigeria. Buxton, P. A. 1935; Hutson, H. P. & Bannerman, D. A. 1930.

Northeast African Province

Eritrea. Boetticher, H. 1920; Zedlitz, O. 1910.

Ethiopia. Erlanger, C. 1904; Friedmann, H. 1930a; Hawker, R. M. 1899; Mearns, E. A. 1915; Neumann, O. 1904; Ogilvie-Grant, W. R. 1913c; Thesiger, W. & Meynell, M. 1935; Zedlitz, O. 1910.

Kenya. Friedmann, H. 1930a; Mearns, E. A. 1915; Meinertzhagen, R. 1921b; Ogilvie-Grant, W. R. 1900b.

Somaliland. Bannerman, D. A. 1910b; Erlanger, C. 1904; Hawker, R. M. 1899; Meinertzhagen, R. 1921b; Ogilvie-Grant, W. R. 1900c, 1901, 1904a; Witherby, H. F. 1905.

Abyssinian Highland District

Anglo-Egyptian Sudan. Bowen, W. W. 1925, 1926-31; Slater, W. L. & Mackworth-Praed, C. W. 1918. Book.

Text in German. Cretzschmar, P. J. 1846.

British Somaliland. Phillips, E. L. 1896.

Ethiopia. Cheesman, R. E. & Sclater, W. L. 1935.

Somali Arid District

Eritrea. Heuglin, M. T. 1859, 1862.

Kenya. Bannerman, D. A. 1910a; Dearborn, N. 1909; Gurney, G. H. 1909; Jackson, F. J. 1899; Mackworth-Praed, C. W. 1917; Meinertzhagen, R. 1921b; Sharpe, R. B. 1891, 1902b. Book. Text in English. Jackson, F. J. 1926.

Somaliland. Speke, J. H. 1860; Thesiger, W. & Meynell, M. 1935; Zedlitz, O. 1914.

Tanganyika. Bannerman, D. A. 1910a; Meinertzhagen, R. 1921b.

Eastern and Southern Province

East African Highland District

Belgian Congo. Chapin, J. P. 1932; Gyldenstolpe, N. C. 1924; Ogilvie-Grant, W. R. 1908b.

Kenya. Bannerman, D. A. 1910a; Dearborn, N. 1909; Friedmann, H. 1928a, 1930a; Grant, C. H. 1915; Granvik, H. 1923; Gurney, G. H. 1909; Gyldenstolpe, N. C. 1924; Hinde, S. L. 1900b; Jackson, F. J. 1899; Mackworth-Praed, C. W. 1917; Mearns, E. A. 1915; Meinertzhagen, R. 1921b; Ogilvie-Grant, W. R. 1900b; Sharpe, R. B. 1891, 1902b; Van Someren, V. G. 1916. Book. Text in English. Jackson, F. J. 1926.

Nyasaland. Paget-Wilkes, A. H. 1928; Paget-Wilkes, A. H. & Sladen, A. G. 1930; Percival, A. B. 1902; Roberts, C. C. 1924; Shelley, G. E. 1901a, b; Vincent, J. 1935. Book. Text in English. Belcher, C. F. 1930.

Portuguese East Africa. Vincent, J. 1933.

Tanganyika. Bannerman, D. A. 1910a; Grote, H. 1912; Lynes, H. & Lowe, W. P. 1934; Meinertzhagen, R. 1921b; Oberholser, H. C. 1905a. Book. Text in German. Reichenow, A. 1894.

Angolan Highland District

Angola. Hartlaub, C. G. 1861.

Belgian Congo. Chapin, J. P. 1932; Mouritz, G. B. 1914; Neave, S. A. 1910; Reichenow, A. 1923.

Northern Rhodesia. Neave, S. A. 1910.

East African Lowland District

Kenya. Dearborn, N. 1909; Granvik, H. 1923; Jackson, F. J. 1899; Meinertzhagen, R. 1921b; Sharpe, R. B. 1891, 1902b. Book. Text in English. Jackson, F. J. 1926.

Portuguese East Africa. Sperling, R. M. 1868; Vincent, J. 1933.

Tanganyika. Bannerman, D. A. 1910a; Friedmann, H. 1928a; Grote, H. 1912, 1921; Meinertzhagen, R. 1921b; Sclater, W. L. & Moreau, R. E. 1932. Book. Text in German. Reichenow, A. 1894.

Zanzibar. Sperling, R. M. 1868; Vaughan, J. H. 1929.

Southeast Veldt District

Cape Province. James, H. W. 1925; Paget-Wilkes, A. H. 1924; Sharpe, R. B. 1904a; Shortridge, G. C. 1904.

Natal. Clarke, S. R. 1904; Gurney, J. H. 1860; Woodward, R. B. & Woodward, J. D. 1900.

Northern Rhodesia. Alexander, B. 1899.

Orange Free State. Clarke, S. R. 1904; Symonds, E. 1887; Whitehead, C. H. 1903.

Portuguese East Africa. Alexander, B. 1899; Sclater, W. L. 1899; Sperling, R. M. 1868; Vincent, J. 1933.

Southern Rhodesia. Chubb, C. 1909; Marshall, G. A. 1900; Mouritz, G. B. 1915; Shelley, G. E. 1882; Swynnerton, C. F. 1907. Book. Text in English. Priest, C. D. 1929, 1933.

Transvaal. Gurney, J. H. 1887.

Union of South Africa. Layard, E. L. 1871; Roberts, A. 1917; Sclater, W. L. 1906, 1911; Shelley, G. E. 1882; Sperling, R. M. 1868. Books. Text in English. FitzSimons, F. W. 1923; Horsburgh, B. R. 1912; Layard, E. L. 1875-84; Stark, A. C. & Sclater, W. L. 1900-06.

Southwest Arid District

Angola. Bannerman, D. A. 1912b; Hartlaub, C. G. 1861.

Bechuanaland. Ogilvie-Grant, W. R. 1912c.

Cape Province. Bannerman, D. A. 1912b; James, H. W. 1925; Layard, E. L. 1871; Roberts, A. 1917; Selater, W. L. 1906, 1911; Sharpe, R. B. 1904a; Shelley, G. E. 1882; Sperling, R. M. 1868. Books. Text in English. Fitz-Simons, F. W. 1923; Horsburgh, B. R. 1912; Layard, E. L. 1875-84; Stark, A. C. & Selater, W. L. 1900-06.

Orange Free State. Clarke, S. R. 1904.

Southern Rhodesia. Chubb, C. 1909; Mouritz, G. B. 1915; Shelley, G. E. 1882. Books. Text in English. Priest, C. D. 1929, 1933.

Southwest Africa. Bannerman, D. A. 1912b. Book. Text in English. Anderson, C. J. 1872.

Malagasy Region

MADAGASCAR

Book. Text in French. Schlegel, H. & Pollen, F. P. 1868.

General. Geoffroy Saint-Hilaire, I. 1839; Hartlaub, C. J. 1860; Oberholser, H. C. 1900a; Roch, S. & Newton, E. 1862; Sibree, J. 1891.

Mauritius. Meinertzhagen, R. 1912.

AMERICA

Book. Text in French. Levaillant, F. 1801-02.

General. *Cory, C. B. 1918; Cory, C. B. & Hellmayr, C. E. 1924.

America and adjacent islands. *Hellmayr, C. E. 1925-35.

North America

Books. Text in English. Audubon, J. J. 1827-38, 1860-61; *Baird, S. F., Brewer, T. M., & Ridgway, R. 1874; Coues, E. B. 1903; Nuttall, T. 1832; Pearson, T. G. 1917; Ridgway, R. 1901; Wilson, A., Bonaparte, C. L., Ord, G., & Jardine, W. 1832; Wilson, A. & Ord, G. 1808-14. Anatidae. Elliot, D. G. 1898. Charadrioidae. Elliot, D. G. 1895. Compsothlypidae. *Chapman, F. M. 1907b. Falconoidae. May, J. B. 1935. Game birds. Reed, C. A. 1912. Water birds. Baird, S. F., Brewer, T. M., & Ridgway, R. 1884; Elliot, D. G. 1898; Phillips, J. C. & Lincoln, F. C. 1930.

General. Baird, S. F. 1866; *Bent, A. C. 1919, 1921, 1922, 1923, 1925, 1926, 1927, 1929, 1932, 1937.

Future of North American fauna. Includes birds. Hahn, W. L. 1913.

Introduced species. Phillips, J. C. 1928b. *Passer*. Zipperlen, A. 1880. *Phasianus colchicus torquatus*. Leffingwell, D. J. 1928.

Origin of North American fauna. Allen, J. A. 1893a; Lönnberg, A. J. 1927b.

DIVISIONS OF NORTH AMERICA

Boreal North America. Book. Text in English. Swainson, W. & Richardson, J. 1831.

Coasts of western North America and adjacent islands. Townsend, C. H. 1890.

Eastern North America. Trotter, S. 1909, 1912. Books. Text in English. Chapman, F. M. 1912b. Land birds. Popular field guide. Reed, C. A. 1923a.

Northwestern North America. Book. Text in English. Coues, E. B. 1877.

Pacific Coast. Belding, L. 1890. Book. Text in English. Elliot, W. A. 1923.

Pacific Northwest. Tetraonidae. Book. Text in English. Shaw, W. T. 1908.

Western North America. Popular field guide. Book. Text in English. Reed, C. A. 1923b.

Alaska

Books. Text in English. Nelson, E. W. 1887; Turner, L. M. 1886.

General. Bailey, A. M. 1925, 1927; Chapman, F. M. 1902c; Grinnell, J. 1909b; Hersey, F. S. 1916; Jacques, F. S. 1930. Includes birds. Laing, H. M., Taverner, P. A., & Anderson, R. M. 1927; Osgood, W. H. 1904, 1909.

Arctic Ocean in region of Alaska. Jacques, F. S. 1930.

Bering Sea. Friedmann, H. 1932a. Bering Sea and Strait. Jacques, F. S. 1930.

Fort St. Michael region. Hersey, F. S. 1917.

Kotzebue Sound region. Grinnell, J. 1900.

Michalaski, Norton Sound. Adams, E. 1878.

Prince William Sound. Grinnell, J. 1910.

Islands near Alaska

Aleutian Islands. Bent, A. C. 1912; Jacques, F. S. 1930.

Forrester Island. Heath, H. 1915; Willett, G. 1915.

Pribilof Islands. Hanna, G. D. 1920; Osgood, W. H., Preble, E. A., & Parker, G. H. 1915. Book. Text in English. Palmer, W. 1898.

St. Lawrence Island. Friedmann, H. 1932a.

St. Matthew Island. Hanna, G. D. 1917.

Canada

Books. Text in English. Macoun, J. & Macoun, J. M. 1909; Nuttall, T. 1832.

General. Taverner, P. A. 1934.

Athabaska-MacKenzie region. Preble, E. A. 1908.

Baffin Land. Hesse, E. 1915; Soper, J. D. 1928.

Central Canada. Blakistoni, R. A. 1861, 1863.

Eastern Canada. Palmer, W. 1890.

Islands in Gulf of St. Lawrence. Palmer, W. 1890.

Labrador. Hantzsch, B. 1908; Lewis, H. F. 1925; Norton, A. H. 1901; Palmer, W. 1890; Townsend, C. W. 1917a; Townsend, C. W. & Bent, A. C. 1910.

Magdalen Islands. Palmer, W. 1890.

Manitoba. Fleming, J. H. 1920; Seton, E. T. 1891, 1909.

New Brunswick. Philipp, P. B. & Bowdish, B. S. 1917. St. John Valley. Townsend, C. W. 1912a.

Newfoundland. Griscom, L. 1926a; Noble, G. K. 1919; Palmer, W. 1890; Rooke, K. B. 1935. *Sula [Moris] bassana*. Wynne-Edwards, V. C. 1935a.

Nova Scotia. Cape Breton Island region. Allen, F. H. 1891.

Prince Edward Island. MacSwain, J. 1908.

Saskatchewan. Bent, A. C. 1907; Fleming, J. H. 1920; Mitchell, H. H. 1924.

Vancouver Island. Alford, C. E. 1928; Brown, R. 1868. Includes birds. Swarth, H. S. 1912c.

Western Canada. Taverner, P. A. 1926.

Alberta

General. Taverner, P. A. 1919.

Alix and Buffalo Lake districts. Horsbrugh, C. B. 1915.

British Columbia

Book. Text in English. Brooks, A. 1925b.

General. Chapman, F. M. 1890a; Kelso, J. E. 1926. Includes birds. Swarth, H. S. 1924.

Canadian Rockies, Jasper Park, Yellowhead Pass, Mount Robson. Riley, J. H. 1913.

Chilliwack District. Brooks, A. 1917.

Northern British Columbia. Stikine River region. Swarth, H. S. 1927.

Queen Charlotte Isles. Includes birds. Osgood, W. H. 1901.

Ontario

Books. Text in English. McIlwraith, T. 1894; Nash, C. W. 1900, 1904. Falcones & Strigidae. Snyder, L. L. 1932.

General. Faull, J. H. & Fleming, J. H. 1913; Nash, C. W. 1898; Soper, J. D. 1923.

Parry Sound and Muskoka. Fleming, J. H. 1901.

Point Pelee in Lake Erie. Taverner, P. A. & Swales, B. H. 1908.

Quebec

Hatley, Stanstead County. Mousley, W. H. 1916, 1921a.

Percé and Bonaventure Island. Sea birds. Book. Text in English. Wynne-Edwards, V. C. 1937.

Greenland

Books. Text in English. Hagerup, A. T. 1891.

Text in Danish. Schiøler, E. L. 1925-31.

General. Helms, O. 1926; Nicholson, E. M. 1930; Pedersen, A. 1926; Schaanning, H. T. 1933b.

West Greenland. Schalow, H. 1895; Stone, W. 1892.

Island of Mellum. Culemann, H. W. 1928.

United States

See Chapman, F. M. 1912b, for State bibliographies.

General. Breeding colonies of *Pelecanus erythrorhynchos*. United States National Park Service 1932.

Introduced species. Prout, J. S. 1884.

New England. Allen, G. M. 1909. Book. Text in English. *Forbush, E. H. 1925-27. Stearns, W. A. 1883-85. Game birds, wild fowl, and shore birds. Forbush, E. H. 1912.

Northeastern United States. Book. Text in English. Saunders, A. A. 1935.

Western United States

Books. Text in English. Bailey, F. A. 1921; Myers, H. W. 1922.

Great Basin. Oberholser, H. C. 1921.

Pacific states. Book. Text in English. Hoffmann, R. 1927.

Southwestern United States. Fisher, A. K. 1893c.

National Parks

General. Books. Text in English. Wright, G. M. & Thompson, B. H. 1935. Include birds. United States National Park Service 1933, 1935b. Check list. United States National Park Service 1937b.

Bryce Canyon. Includes birds. United States National Park Service 1934.

Carlsbad Cavern. Includes birds. United States National Parks 1928.

General Grant. Includes birds. Check list. Book. Text in English. United States National Park Service 1920b.

Glacier National Park. Includes birds. Book. Text in English. United States National Park Service 1918.

Grand Canyon. Check list. United States National Park Service 1930, 1937a, 1939.

Mount McKinley National Park. Includes birds. Book. Text in English.

United States National Park Service 1938a.

Mount Rainier National Park. United States National Park Service 1920c. Includes birds. Taylor, W. P. & Shaw, W. T. 1927.

Rocky Mountain National Park. Includes birds. United States National Park Service 1920c.

Sequoia. Includes birds. Check list. United States National Park Service 1920b.

Yellowstone. Kemsies, E. 1935; Skinner, M. P. 1925. United States National Park Service 1920a. Includes birds. United States National Parks 1938.

Yosemite. United States National Park Service 1938b. Includes birds. Grinnell, J. & Storer, T. I. 1924. Book. Text in English. Grinnell, J. & Storer, T. I. 1921. Summer birds. United States National Park Service 1920d.

Zion National Park. United States National Park Service 1935a.

Alabama

Book. Text in English. Howell, A. H. 1924.

Autauga and Montgomery counties. Golsan, L. S. & Holt, E. G. 1914.

Arizona

General. Fisher, A. K. 1893c; Oberholser, H. C. 1930; Swarth, H. S. 1914.

Cochise County. Osgood, W. H. 1903.

Gila and Pinal counties. Scott, W. E. 1887-88.

Huachuca Mountains. Southeastern part. Swarth, H. S. 1904.

Keam Canyon. Fisher, A. K. 1903.

Pima County. Scott, W. E. 1887-88; Visher, S. S. 1910.

Southern Arizona. Includes birds. Swarth, H. S. 1929.

Arkansas

General. Baerg, W. J. 1931; Howell, A. H. 1911.

California

Books. Text in English. Wheelock, I. G. 1904. Game birds. Grinnell, J., Bryant, H. C., & Storer, T. I. 1918.

General. Hall, H. M. & Grinnell, J. 1919. Trochilidae. Woods, R. S. 1927. Water birds. Loomis, L. M. 1900.

Death Valley. Fisher, A. K. 1893c; Grinnell, J. 1923.

Deserts. Howell, A. B. 1923.

Fresno district. Tyler, J. G. 1913.

Inner Coast Range. Mailliard, J. 1919b.

Lassen Peak region. Includes birds. Grinnell, J., Dixon, J. S., & Linsdale, J. M. 1930.

Lower Colorado River Valley. Includes birds. Grinnell, J. 1914a.

Modoc County. Includes birds. Mailliard, J. 1927b.

Mount Sanhedrin. Includes birds. Stone, W. 1904.

Mount Shasta. Includes birds. Merriam, C. H. 1899.

Northern California. Includes birds. Grinnell, J. 1916.

Pacific slope of southern California. Willett, G. 1912.

Salton Sea. Grinnell, J. 1908b.

San Bernardino Mountains. Includes birds. Grinnell, J. 1908a.

San Clemente Island. Howell, A. B. 1917.

San Diego County. Stephens, F. 1919.

San Francisco Bay region. Grinnell, J. & Wythe, M. W. 1927.

San Jacinto area. Grinnell, J. & Swarth, H. S. 1913.

San Miguel Island. Howell, A. B. 1917.

Santa Barbara Islands. Howell, A. B. 1917.

Siskiyou County. Includes birds. Mailliard, J. 1921.

Siskiyou Mountains. Anderson, M. P. & Grinnell, J. 1903.

Southern California. Fisher, A. K. 1893c.

Southwestern California. Willett, G. 1933.

Colorado

Books. Text in English. Bergtold, W. H. 1928a; Sclater, W. L. 1912.

General. Cooke, W. W. 1900.

Barr Lake district. Hersey, L. J. & Rockwell, R. B. 1909.

Elk Mountain region. Warren, E. R. 1916.

Golden region. Rockwell, R. B. & Wetmore, A. 1914.

Montrose County. Warren, E. R. 1909.

Northwestern Colorado. Warren, E. R. 1908. Includes birds. Felger, A. H. 1910. Winter fauna. Sclater, W. L. 1908.

Rocky Mountain National Park. United States National Park Service 1920c.

Yuma County. Lincoln, F. C. 1915.

Connecticut

General. Sage, J. H. & Bishop, L. B. 1913.

Delaware

General. Rhoads, S. N. & Pennock, C. J. 1905.

District of Columbia

Washington region. Cooke, M. T. 1929.

Florida

Books. Text in English. Bailey, H. H. 1925; Cory, C. B. 1896; Howell, A. H. 1932; Maynard, C. J. 1872-78. Includes birds. Catesby, M. 1731-43.

East Florida. Includes birds. Allen, J. A. 1871b.

Leon County. Williams, R. W. 1904, 1928.

Lower Suwanee River region. Chapman, F. M. 1891a.

Georgia

Atlanta region. Greene, E. R. 1933.

Northeastern Georgia. Burleigh, T. D. 1927.

Illinois

Book. Text in English. Gault, B. T. 1922.

General. Cory, C. B. 1909a. Autumn birds. Forbes, S. A. 1910. Summer birds. Forbes, S. A. 1908, 1921.

Champaign County. Hess, I. E. 1910.

Chicago region. Ford, E. R., Sanborn, C. C., & Coursen, C. B. 1934; Woodruff, F. M. 1907a.

Iowa

General. Anderson, R. M. 1907; Du Mont, P. A. 1934. Rapacious birds. Bailey, B. H. 1918.

Clay and O'Brien counties. Gabrielson, I. N. 1917.

Winnebago and Hancock counties. Book. Text in English. Anderson, R. M. 1897.

Kansas

Book. Text in English. Goss, N. S. 1891.

General. Lantz, D. E. 1899; Snow, F. H. 1903.

Johnson County. Harris, H. 1919.

Missouri River region. Doniphan County. Linsdale, J. M. 1928a, b.

Louisiana

General. Alexander, M. L. 1918; Beyer, G. E. 1900b; Beyer, G. E., Allison, A., & Kopman, H. H. 1906; Kopman, H. H. 1915; McIlhenny, E. A. 1897.

Chenier au Tigre. Bailey, A. M. 1928b.

Jefferson Parish. Kopman, H. H. 1905a.

Southern Louisiana. Bailey, A. M. 1931.

West Baton Rouge Parish. Allison, A. 1904.

Maine

Book. Text in English. Knight, O. W. 1908.

Lake Umbagog region. Brewster, W. 1924.

Maryland

General. Kirkwood, F. C. 1895.

Allegany County. Eifrig, C. W. 1904; Merriam, C. H. & Preble, E. A. 1900.

Baltimore. Andrews, E. A. 1925.

Garrett County. Eifrig, C. W. 1904.

Massachusetts

Books. Text in English. *Forbush, E. H. 1925-27; Howe, R. H. & Allen,

G. M. 1901. Game birds, wild fowl, and shore birds. Forbush, E. H. 1912.

General. Allen, J. A. 1864.

Berkshire County. Faxon, W. & Hoffmann, R. 1900.

Cambridge region. Brewster, W. 1906.

Essex County. Townsend, C. W. 1905.

Hampshire County. Clark, H. L. 1906a.

Ipswich region. Book. Text in English. Townsend, C. W. 1912b.

Muskeget Island. *Asio f. flammeus*. Brewster, W. 1898b.

Michigan

Book. Text in English. Barrows, W. B. 1912.

General. Cook, A. J. 1893. Check list. Van Tyne, J. 1938.

Au Sable Valley. Wood, N. A. & Frothingham, E. H. 1905.

Charity Islands. Wood, N. A. 1911.

Dickinson County. Gaige, F. M. 1914.

Douglas Lake region. Sheboygan County. Wood, N. A. 1916.

Hamlin Lake region. Mason County. Chaney, R. W. 1910b.

Mackinac Island. White, S. E. 1893.

Minnesota

Book. Text in English. *Roberts, T. S. 1932.

General. Roberts, T. S. 1919. Winter birds. Roberts, T. S. 1916.

Crooked Lake region. Honeywill, A. W. Jr. 1911.

Leech Lake region. Currier, E. S. 1904.

Mississippi

General. Stockard, C. R. 1905.

Tishomingo County. Allison, A. 1907.

Missouri

General. Bennitt, R. 1932; Widmann, O. 1907a.

Carter and Shannon counties. Woodruff, E. S. 1908b.

Johnson, Clay, and Platte counties. Harris, H. 1919.

Kansas City region. Harris, H. 1919.

Montana

General. Saunders, A. A. 1921a.

Custer and Dawson counties. Cameron, E. S. 1907.

Fergus County. Silloway, P. M. 1903b.

Flathead Lake. Silloway, P. M. 1903a.

Fort Buford region. Bailey, V. 1888.

Swan Lake. Silloway, P. M. 1903a.

Nebraska

General. Bruner, L. 1896; Wolcott, R. H. 1909.

Thomas County Forest Reserve. Zimmer, J. T. 1913.

Nevada

Humboldt County. Taylor, W. P. 1912.

Southern Nevada. Fisher, A. K. 1893c.

New Jersey

Book. Text in English. Stone, W. 1894a.

General. Harlow, R. C. 1918; Stone, W. 1909.

Newark marshes. Abbott, C. G. 1907.

New Mexico

General. Bailey, F. A. 1928; Oberholser, H. C. 1930.

Gila River headwaters. October birds. Bergtold, W. H. 1912.

Lake Burford. Wetmore, A. 1920e.

New York

Book. Text in English. Eaton, E. H. 1910-14.

Central New York marshes. Summer birds. Saunders, A. A. 1926.

Dutchess County. Griscom, L. 1933.

Finger Lakes region. Spiker, C. J. 1935. Cayuga Lake basin. Includes

birds. Reed, H. D. & Wright, A. W. 1909.

Long Island. Braislin, W. C. 1907. Shore birds. Nichols, J. T. & Harper, F. 1916.

Northern New York, St. Lawrence Valley and lowlands. Book. Text in English. Sawyer, E. J. 1916.

Oneida County. Ralph, W. L. & Bagg, E. 1890.

Oneida Lake region. Stoner, D. 1932.

Palisades Interstate Park. Bear Mountain and Harriman Park sections. Summer birds. Silloway, P. M. 1920.

North Carolina

General. Book. Text in English. Pearson, T. G., Brimley, C. S., & Brimley, H. H. 1919.

Sand hills. Winter birds. Book. Text in English. Skinner, M. P. & Achorn, J. W. 1928.

Western North Carolina. Summer birds. Oberholser, H. C. 1905b.

North Dakota

General. Wood, N. A. 1923. Waterfowl. Lincoln, F. C. 1925a.

Bottineau, Devil's Lake, Grand Forks, Harwood, & Pembina. Bailey, V. 1888.

Ohio

Book. Text in English. Dawson, W. L. & Jones, L. 1903.

General. Hicks, L. E. 1935b; Jones, L. 1903; Kirkpatrick, J. 1859; Wheaton, J. M. 1882. Game and song birds. Hicks, L. E. 1932c. Winter birds. Hicks, L. E. & Chapman, F. B. 1933.

Ashtabula County. Hicks, L. E. 1933a.

Central Ohio. Hicks, L. E. 1935e.

Wayne County. Oberholser, H. C. 1896.

Oklahoma

General. Nice, M. M. 1931a; Nice, M. M. & Nice, L. B. 1924. Picinae. Crabb, E. D. 1930.

Campus of University of Oklahoma. Nice, M. M. 1930b.

Central Oklahoma. Nice, M. M. 1928.

Oregon

Book. Text in English. Shaw, W. T. 1908.

Portland region. Jewett, S. G. & Gabrielson, I. N. 1929.

Willow Creek Valley, Malheur County. Summer birds. Peck, M. E. 1911b.

Pennsylvania

Book. Text in English. Sutton, G. M. 1928; Warren, B. H. 1888.

General. Harlow, R. C. 1918.

Anthracite coal region. Summer birds. Young, R. T. 1896.

Eastern Pennsylvania. Stone, W. 1894.

Erie and Presque Isle. Todd, W. E. 1904.

Lancaster. Book. Text in English. Beck, H. H. 1924.

Northern Elk County. Baily, W. L. 1896.

Chester County

Book. Text in English. Burns, F. L. 1919.

Rapacious birds. Warren, B. H. 1884.

Small area. Burns, F. L. 1901a.

West Chester. Montgomery, T. H. 1897.

South Carolina

Books. Text in English. Wayne, A. T. 1910. Includes birds. Catesby, M. 1731-43.

General. Loomis, L. M. 1894; Sprunt, A. & Chamberlain, E. B. 1931.

Chester County. Loomis, L. M. 1891.

Coast. Sprunt, A. 1925.

South Dakota

Flandreau. Bailey, V. 1888.

Fort Sisseton. Bailey, V. 1888; Youngworth, W. 1935.

Harding County. Visher, S. S. 1911.

Tennessee

General. Ganier, A. F. 1933a; Howser, W. D. 1917.

Nashville, George Peabody College campus. Shaver, J. M. 1934.

Reelfoot Lake. Ganier, A. F. 1933c.

Texas

General. Eifrig, C. W. 1929.

Austin region. Book. Text in English. *Simmons, G. F. 1925.

Brewster County. Van Tyne, J. & Sutton, G. M. 1937.

Brownsville region, southern Texas. Griscom, L. & Crosby, M. S. 1925.

Kerr County. Smith, A. P. 1916.

Kerrville and vicinity. Lacey, H. G. 1911.

Lower Rio Grande Valley. Friedmann, H. 1925.

Southeastern Texas. Pearson, T. G. 1921.

Utah

General. Fisher, A. K. 1893c.

Bear River marshes. Wetmore, A. 1921c.

Vermont

General. Perkins, G. H. & Howe, C. D. 1901.

Mount Mansfield region. Howell, A. H. 1901.

Virginia

Book. Text in English. Bailey, H. H. 1913.

General. Murray, J. J. 1933; Rives, W. C. 1890.

Cobb's Island. Kuerzi, J. F. 1929.

Rockbridge County. Murray, J. J. 1935.

Washington

Book. Text in English. Dawson, W. L. & Bowles, J. H. 1909.

Cape Disappointment. Kobbé, W. H. 1900a.

Central and southeastern Washington. Snodgrass, R. E. 1904.

Mount Rainier National Park. Book. Text in English. Taylor, W. P. & Shaw, W. T. 1927.

Olympic Mountains, Lake Crescent region. Rathbun, S. F. 1916.

Puget Sound region. Water and shore birds. Rathbun, S. F. 1915.

Walla Walla and Columbia counties. Dice, L. R. 1918.

West Virginia

Book. Text in English. Johnston, I. H. 1923.

General. Brooks, E. A. 1908; Rives, W. C. 1890, 1898. Game birds. Brooks, E. A. 1916b.

Wisconsin

General. Cory, C. B. 1909a; King, F. H. 1883.

Dane County. Schorger, A. W. 1931.

Lake Owen, Bayfield County. Schorger, A. W. 1925.

Mamie Lake region. Jackson, H. H. 1923.

Shiocton, Outagamie County. Grundtvig, F. L. 1888, 1895.

Wyoming

General. Fuller, A. B. & Bole, B. J. 1930; Knight, W. C. 1902.

Yellowstone National Park. Kemsies, E. 1935; Skinner, M. P. 1925. Book. Text in English. United States National Park Service 1920a.

West Indies

Books. Text in English. Cory, C. B. 1889, 1892.

Text in French. Levailant, F. 1801-02.

General. Denny, W. 1847; *Hellmayr, C. E. 1925-35; Kaempfer, E. 1924; Nicoll, M. J. 1904a.

Antigua Island. Riley, J. H. 1904.

Barbados Islands. Bond, J. 1929.

Barbuda Island. Riley, J. H. 1904.

Bermuda Islands. Kennedy, J. N. 1914; Martens, E. 1859.

Cayman Islands. Lowe, P. R. 1911.

Grand Cayman Island. Savage-English, T. M. 1916.

Guadeloupe Island. Noble, G. K. 1916.

Leeward Islands. Cory, C. B. 1909b.

Mona and Desecheo Islands. Struthers, P. H. 1927.

St. Croix. Beatty, H. A. 1930; Newton, A. & Newton, E. 1859.

St. Lucia. Bond, J. 1929.

St. Vincent Island. Bond, J. 1929; Lister, C. E. 1880.

Tobago. Belcher, C. F. & Smooker, G. D. 1935; Feilden, G. S. 1914.

Trinidad Island. Belcher, C. F. & Smooker, G. D. 1935; Hellmayr, C. E. 1906; Feilden, G. S. 1914. Book. Text in French. Léotaud, A. 1866.

Virgin Islands. Danforth, S. T. 1930.

Bahama Islands

Books. Text in English. Include birds. Catesby, M. 1731-43; Cory, C. B. 1890; Riley, J. H. 1905a.

General. Albrecht, R. 1861; Bonhote, J. L. 1901a, 1903b; Riley, J. H. 1905b; Todd, W. E. & Worthington, W. W. 1911.

Evolution of bird fauna. Chapman, F. M. 1891b.

New Providence Island. Bonhote, J. L. 1899.

Northern Islands. Bonhote, J. L. 1903a.

Cuba

General. Barbour, T. 1923; Chapman, F. M. 1892; Gundlach, J. C. 1861a, b.

Isle of Pines. Bangs, O. & Zappey, W. R. 1905; Todd, W. E. 1916.

Dominica

Book. Text in English. Verrill, A. H. 1905.

General. Bond, J. 1929; Verrill, G. E. & Verrill, A. H. 1892.

Haiti (Hispaniola) Island

General. Danforth, S. T. 1929.

Haiti Republic. Bond, J. 1929; Wetmore, A. & Swales, B. H. 1931. Book. Text in English. Cory, C. B. 1885.

San Domingo (Dominican Republic). Kaempfer, E. 1924; Verrill, A. E. & Verrill, A. H. 1909; Wetmore, A. & Swales, B. H. 1931. Book. Text in English. Cory, C. B. 1885.

Jamaica

Book. Text in English. Bangs, O. & Kennard, F. H. 1920.

General. Albrecht, R. 1862; Scott, W. E. 1891a, b.

Port Henderson. Field, G. W. 1894.

Puerto Rico

General. Bowdish, B. S. 1902; Struthers, P. H. 1923; Wetmore, A. 1916a.

Cartagena Lagoon. Danforth, S. T. 1926.

Culebra Island. Wetmore, A. 1917b.

Desecheo Island. Wetmore, A. 1918a.

Guanico Lagoon. Danforth, S. T. 1931.

Middle America

Books. Text in English. Ridgway, R. 1901—; Salvin, O. & Godman, F. D. 1879–1904.

Text in French. Levaillant, F. 1801–02.

General. Hellmayr, C. E. 1925–35; Pycraft, W. P. 1915; Salvin, O. 1861; Sclater, P. L. & Salvin, O. 1859; van Rossem, A. J. 1934.

Bay of Honduras region. Coastal islands. Salvin, O. 1890.

British Honduras. Salvin, O. 1864.

Chiriqui. David and Divala. Bangs, O. 1901b.

Cocos Island. Gifford, E. W. 1913; Snodgrass, R. E. & Heller, E. 1902; Townsend, C. H. 1895.

El Salvador. Dickey, D. R. & van Rossem, A. J. 1938.

Malpelo Island. Townsend, C. H. 1895.

Nicaragua. Rendahl, H. 1919a; Salvin, O. 1872.

COSTA RICA

General. Bangs, O. 1908b, 1909; Cabanis, J. L. & others 1860; Cherrie, G. K. 1891; Rendahl, H. 1919a.

Western Costa Rica. Bangs, O. 1907.

GUATEMALA

General. Dearborn, N. 1907; Nelson, E. W. 1897; Salvin, O. & Sclater, P. L. 1860.

Highlands. Wetmore, A. 1937.

Northern Petén. Van Tyne, J. 1935.

Sierra de las Minas. Griscom, L. 1935a.

HONDURAS

General. Peters, J. L. 1929b; Taylor, G. C. 1860.

Ceiba and Yaruca. Bangs, O. 1903.

MEXICO

General. *Hellmayr, C. E. 1925–35; Nelson, E. W. 1897.

Chihuahua, northwestern region. Allen, J. A. 1893b.

Durango, northwestern region. Miller, W. D. 1906.

Nayarit. McLellan, M. E. 1927.

Sinaloa. McLellan, M. E. 1927; Miller, W. D. 1905.

Sonora, northeastern region. Allen, J. A. 1893b; van Rossem, A. J. 1931.

Tres Marias Isles. Includes birds. Nelson, E. W. 1899.

Vera Cruz. Jalapa and Las Vigas. Chapman, F. M. 1898a. Rain Forest region. Bangs, O. & Peters, J. L. 1927.

Yucatan. Griscom, L. 1926b. Isle of Cozumel. Salvin, O. 1885. Coastal islands. Salvin, O. 1890.

Lower California

Cape region. Brewster, W. 1902.

Colorado Desert. Murphy, R. C. 1917.

Delta of Colorado River. Stone, W. & Rhoads, S. N. 1905.

Guadalupe Island. Bryant, W. E. 1887; Ridgway, R. 1876, 1877.

Los Coronados Islands. Grinnell, J. & Daggett, F. S. 1903; Howell, A. B. 1917.

PANAMA

Book. Text in English. Canal Zone. Sturgis, B. B. 1928.

Panama. Griscom, L. 1935b; Rendahl, H. 1919a.

Canal Zone. Hallinan, T. 1924; Stone, W. 1918.

Pearl Islands. Thayer, J. E. & Bangs, O. 1905. San Miguel. Bangs, O. 1901a.

South America

Books. Text in English. Brabourne, W. W. & Chubb, C. 1913; Gould, J. 1861a.

Text in French. Levaillant, F. 1801-02. Central region. Includes birds. Des Murs, M. A. 1855.

General. Hellmayr, C. E. 1925-35.

Curaçao Island. Berlepsch, H. H. & Peters, E. 1892; Peters, E. 1892.

Falkland Islands. Abbott, C. C. 1861; Bennett, A. G. 1926; Brooks, W. S. 1917.

Galapagos Islands. Gifford, E. W. 1913; *Hellmayr, C. E. 1925-35; Ridgway, R. 1889, 1897; Salvin, O. 1876; Slevin, J. R. 1931; Snodgrass, R. E. & Heller, E. 1904; Swarth, H. S. 1931.

Juan Fernandez Islands. Text in English. Skottsberg, C. J. 1920-31.

La Plata River region. Burmeister, C. H. 1860. Book. Text in English. Hudson, W. H. 1920b.

Oceanic birds. Book. Text in English. *Murphy, R. C. 1936.

ARGENTINA

Book. Text in English. Sclater, P. L. & Hudson, W. H. 1888-89.

General. Chubb, C. 1919; Friedmann, H. 1927b; Grant, C. H. 1911; Holland, A. H. 1891; Wetmore, A. 1926e.

Cape San Antonio. Buenos Aires. Gibson, E. 1918.

Lower Pilcomayo. Kerr, J. G. 1892.

Northwestern Argentina. Lönnberg, A. J. 1903a.

Patagonia. Durnford, H. 1878; Scott, W. E. 1904e; Stone, W. 1928; Wetmore, A. 1926g. Central region. Durnford, H. 1878.

Tucuman and Salta. Salvin, O. 1880.

BOLIVIA

General. Chubb, C. 1919; Grant, C. H. 1911.

Chaco region. Lönnberg, A. J. 1903a.

BRAZIL

Books. Text in German. Pelzeln, A. 1868-70.

Text in Portuguese. Ihering, H. & Ihering, R. 1907.

General. Euler, C. 1900; Holt, E. G. 1928; Ihering, H. 1900b, 1914b; Snethlage, E. 1930; Stone, W. & Roberts,

H. R. 1934. Includes birds. Burmeister, C. H. 1856b.

Cantagallo and Nova Friburgo, Rio de Janeiro region. Passeres. Ihering, H. 1900a.

Capim River region. State of Pará. Goeldi, E. A. 1903.

Lower Amazon Basin. Hellmayr, C. E. 1912; Snethlage, E. 1913.

Matto Grosso. Naumburg, E. M. 1930.

Northeastern Brazil. Forbes, W. A. 1881b; *Hellmayr, C. E. 1929b; Snethlage, H. 1928.

Northern Brazil. Snethlage, E. 1925.

Southern Brazil. Grant, C. H. 1911. São Paulo. Ihering, H. 1898, 1904.

Tapajoz River and Tocantins River regions. Snethlage, E. 1908.

Trinidad Islet. Murphy, R. C. 1915a.

BRITISH GUIANA

Books. Text in English. Chubb, C. 1916. Includes birds. Beebe, C. W. & Hartley, G. I. 1917.

General. Sclater, W. L. 1887.

Coast region. Young, C. G. 1928.

Savannas. Rupununi district. Davis, T. A. 1935.

CHILE

General. Hellmayr, C. E. 1932; Wetmore, A. 1926e.

Cape Horn. Reynolds, P. W. 1935.

COLOMBIA

General. *Chapman, F. M. 1917b; Goodfellow, W. 1901. Trochilidae. Oberholser, H. C. 1902.

Darien district. Bangs, O. & Barbour, T. 1922.

Magdalena River region. Wyatt, C. W. 1871.

Santa Marta region. Todd, W. E. & Carriker, M. A. 1923. Sierra Nevada. Salvin, O. & Godman, F. 1879, 1880.

Western Colombia. Bangs, O. 1908a.

ECUADOR

General. Chapman, F. M. 1926; Chubb, C. 1919; Goodfellow, W. 1901; Salvadori, A. T. & Festa, E. 1899. Trochilidae. Oberholser, H. C. 1902.

FRENCH GUIANA

General. Klaptocz, A. 1913.

Cayenne. Berlepsch, H. H. 1908.

PARAGUAY

General. Chubb, C. 1910; Grant, C. H. 1911; Ihering, H. 1904; Oberholser, H. C. 1903; Wetmore, A. 1926e.

Gran Chaco region. Book. Text in German. Laubmann, H. 1931.

PERU

General. Chubb, C. 1919; Murphy, R. C. 1923b, 1927; Zimmer, J. T. 1930.

Sea coast and islands. Murphy, R. C. 1920.

Southeast Peru. Hellmayr, C. E. 1920.

URUGUAY

General. Aplin, O. V. 1894b; Wetmore, A. 1926e.

VENEZUELA

General. Beebe, C. W. 1909a.

Aruba, Curaçao, and Bonaire Islands. Hartert, E. J. 1893b.

Bermudez. Phelps, W. H. 1897.

Blanquilla Island. Lowe, P. R. 1907a.

Guanta and Laguaryra. Robinson, W. & Richmond, C. W. 1896.

Guarico and Apure. Delacour, J. T. 1923.

Margarita Island. Lowe, P. R. 1907b; Robinson, W. & Richmond, C. W. 1896.

Northwestern Venezuela. Osgood, W. H. & Conover, H. B. 1922.

Orinoco Delta and Paria Peninsula. Stone, W. 1913b.

Orinoco River region. Berlepsch, H. H. & Hartert, E. 1902; Cherrie, G. K. 1916.

Silla de Caracas. Hellmayr, C. E. 1924.

Trinidad Island. Hellmayr, C. E. 1906.

Valencia. Hellmayr, C. E. & Seilern, J. 1912.

WEST GUIANA

Book. Text in Dutch. Penard, F. P. & Penard, A. P. 1908-10.

General. Young, C. G. 1927.

ASIA

General. Kinnear, N. B. 1922; Sievertsov, N. A. 1873.

Andaman Islands. Walden, A. 1873.

Baluchistan. Kelat. St. John, O. B. 1889.

Himalaya Mountains. Pelzeln, A. 1868.

Malay Peninsula. Robinson, H. C. & Kloss, C. B. 1910.

Manchuria (Manchukuo). Ingram, C. 1909a; Taka-Tsukasa, N., Hachisuka, M., Kuroda, N., Yamashina, Y., & Uchida, S. 1933; Stegmann, B. C. 1930.

Persian Gulf. Bahrein Island. Ticehurst, C. B. & Cheesman, R. E. 1925.

Southern Asia. Sievertsov, N. A. 1873.

Syria and adjacent countries. Carruthers, D. 1910b; Meinertzhagen, R. 1935.

Transjordan and Petra. Meinertzhagen, R. 1925b.

Afghanistan

General. St. John, O. B. 1889.

Hariab district. Ramsay, R. G. 1880.

Southern Afghanistan. Swinhoe, C. 1882.

Arabia

Aden. Barnes, H. E. 1893; Meinertzhagen, R. 1924b; Yerbury, J. W. 1896.

Central Arabia and Jidda. Bates, G. L. & Philby, H. S. 1936.

Dead Sea region. Carruthers, D. 1910b.

Jabrin, Jafura, and Hasa. Ticehurst, C. B. & Cheesman, R. E. 1925.

Northwestern Arabia. Carruthers, D. 1910b.

Yemen, southwestern Arabia. Sclater, W. L. 1917.

SYRIAN DESERT

General. Sclater, P. L. 1906; Weigold, H. 1912a.

Central Syrian Desert. Weigold, H. 1912a.

Southern Syrian Desert. Meinertzhagen, R. 1924a.

Central Asia

Book. Text in French. Menzbir, M. A. 1888-94.

General. Hellmayr, C. E. 1929a; Kollibay, P. R. 1916a; Loudon, H. 1909; Oberholser, H. C. 1900b; Schalow, H. 1901, 1908.

Kirghiz Steppe. Sushkin, P. P. 1914.

TURKESTAN

General. Sievertsov, N. A. 1873.

Chinese Turkestan. Ludlow, F. & Kinnear, N. B. 1933.

Kara-Kum Desert. Snigirewski, S. I. 1928.

Pamir Mountains. Sievertsov, N. A. 1883b.

Zarafshan Basin, Russian Turkestan. Carruthers, D. 1910a.

China

Book. Text in English. Gee, N. G., Moffett, L. I., & Wilder, G. D. 1926.

General. La Touche, J. D. 1913; Swinhoe, R. 1873a.

Quangtung coast. Kershaw, J. C. 1904.

Talien Bay. Swinhoe, R. 1861a.

Wei Hai Wei. Jones, K. H. 1911.

West China. Gan-su (Kan-su) province. Deditius, K. 1897; Lönnberg, A. J. 1924; Riley, J. H. 1930a.

CENTRAL CHINA

Chihli province. La Touche, J. D. 1920; Riley, J. H. 1930a.

Hupei province. La Touche, J. D. 1922.

Kansu. Riley, J. H. 1930a.

EASTERN CHINA

Book. Text in English. La Touche, J. D. 1925-34.

Amoy. Swinhoe, R. 1860, 1867.

Canton. Swinhoe, R. 1861b.

Hongkong and Macao. Swinhoe, R. 1861b; Vaughan, R. E. & Jones, K. H. 1913.

Jehol. Taka-Tsukasa, N., Hachisuka, M., Kuroda, N., Yamashina, Y., & Uchida, S. 1933.

Peking (Peiping). Walton, H. A. 1903; Wilder, G. D. 1930.

Shantung province. Chefoo. Swinhoe, R. 1874.

Si Kiang River region. Vaughan, R. E. & Jones, K. H. 1913.

LOWER YANGTSE VALLEY

General. Gee, N. G. & Moffett, L. I. 1917; Styan, F. W. 1891.

Chinkiang. La Touche, J. D. 1906.

SOUTHEASTERN CHINA

Fokien. Bangs, O. 1921; La Touche, J. D. 1899, 1917; Martens, G. H. 1910; Rickett, C. B. 1900.

Foochow. La Touche, J. D. 1892; Styan, F. W. 1887.

Kwangsi. Stresemann, E. 1930a, b.

Swatow. La Touche, J. D. 1892.

SOUTHERN CHINA

General. Mell, R. 1923; Ogilvie-Grant, W. R. 1900a.

Hainan Island. Swinhoe, R. 1870.

Szechwan province. Riley, J. H. 1926. Western section. Seeböhm, H. 1891.

YUNNAN PROVINCE

General. Bangs, O. 1921; Riley, J. H. 1926.

Southeast Yunnan. La Touche, J. D. 1923.

West-central and northwest Yunnan. Rothschild, L. W. 1921, 1926b.

Western Yunnan. Anderson, J. 1879a.

French Indo-China

General. Bangs, O. & Van Tyne, J. 1931; Delacour, J. T. & Jabouille, P. 1928. Migratory birds. Delacour, J. T. 1929.

Annam. Robinson, H. C. 1919. Columbiformes & Galliformes. Book. Text in French. Delacour, J. T. & Jabouille, P. 1927.

Cochin China. Robinson, H. C. 1919.

Northern Tonkin (Tongking). Kinnear, N. B. 1929.

Quangtri (Kwangtri), Annam. Delacour, J. T. & Jabouille, P. 1925.

India

Books. Text in English. Baker, E. C. 1921-30; Dewar, D. 1909, 1915, 1923; Jerdon, T. C. 1862-64; Murray, J. A. 1888-90; Whistler, H. 1935. Anatidae. Wright, R. G. & Dewar, D. 1925. Game birds. Hume, A. O. & Marshall, C. H. 1879-81; Le Messurier, A. 1904.

General. Baker, E. C. 1922b; Beavan, R. C. 1865; Blyth, E. 1863, 1866.

Bashehr. Whistler, H. 1923a.

Calcutta district. Munn, P. W. 1894.

Central India. Swinhoe, C. & Barnes, H. E. 1885.

Kashmir. Whistler, H. 1923a.

Ladak. Meinertzhagen, R. 1927; Osmaston, B. B. 1925.

Lahul. Whistler, H. 1925.

Lucknow. Jesse, W. 1902.

Nynee Tal and Almorah. Brooks, W. E. 1869.

Oudh and Kumaon. Irby, L. H. 1861.

Punjab. Jhang district. Whistler, H. 1922. Jhelum district. Whistler, H. 1916. Kangra district. Whistler, H. 1926.

Quetta. Meinertzhagen, R. 1920a.

Rawal Pindi district. Whistler, H. 1930.

Sikkim. Meinertzhagen, R. 1927.

Sind province. Ticehurst, C. B. 1922.

BURMA

Books. Text in English. Baker, E. C. 1921-30; Oates, E. W. 1883. Game birds. Hume, A. O. & Marshall, C. H. 1879-81.

General. Bangs, O. 1921; Stanford, J. K. 1935; Walden, A. 1875.

Southern Shan States, Upper Burma. Bingham, C. T. 1903; Rippon, G. 1897, 1901.

CEYLON

Books. Text in English. Baker, E. C. 1921-30; Murray, J. A. 1890. Game birds. Hume, A. O. & Marshall, C. H. 1879-81.

General. Blyth, E. 1867; Layard, E. L. 1880b.

Hill region. Legge, W. V. 1874, 1875.

Malay Peninsula. Book. Text in English. Robinson, H. C. 1927-28.

Northern India. Gilgit. Biddulph, J. 1881; Scully, J. 1881. Kohat and Kurram. Whitehead, C. H. 1909.

Sabaragamuwa province. Lewis, F. 1898.

Southern Ceylon. Legge, W. V. 1875.

Spiti. Whistler, H. 1923a.

Straits Settlement. Kelham, H. R. 1881.

Tenasserim. Lowe, W. P. 1933.

Iraq (Mesopotamia)

General. Meinertzhagen, R. 1914, 1924c.

Northwest. Weigold, H. 1912a.

Japan

Books. Text in English. Hachisuka, M. 1925; Kuroda, N. & others 1922; Seebohm, H. 1890c; Taka-Tsukasa, N. 1932-35.

General. Blakiston, T. & Pryer, H. 1878; Ingram, C. 1908c; Seebohm, H. 1879; Taka-Tsukasa, N. & Hachisuka, M. 1925.

Fujiyama. Book. Text in Japanese. Kuroda, N. 1926a.

Hakodadi. Whitely, H. 1867.

Kuril Islands. Stejneger, L. H. 1899a.

Northern Japan. Blakiston, R. A. 1862; Swinhoe, R. 1863a.

Tsushima and Iki Islands. Kuroda, N. 1922.

FORMOSA ISLAND

General. Ogilvie-Grant, W. R. 1908a; Ogilvie-Grant, W. R. & La Touche, J. D. 1907; Swinhoe, R. 1863b, 1866.

Southern region. La Touche, J. D. 1895.

Korea

General. Campbell, C. W. 1892.

Island of Askold. Taczanowski, W. 1881.

Mongolia

Book. Text in Slavic. Kozlova, E. V. 1930.

Central Gobi. Kozlova, E. V. 1932.

Inner Mongolia. Riley, J. H. 1930a.

Northern Mongolia. Kozlova, E. V. 1932.

Palestine

General. Carruthers, D. 1910b; Meinertzhagen, R. 1925b; Phillips, J. C. 1915b; Sladen, A. G. 1919.

Dead Sea. Carruthers, D. 1910b.

Jerusalem. Sheppard, R. W. 1933.

Southern Palestine. Meinertzhagen, R. 1920b; Tristram, H. B. 1859a, 1865.

Persia (Iran)

General. Sarudny, N. A. 1911; Stresemann, E. 1928a.

Elburz Mountains. Heinrich, G. 1928; Witherby, H. F. 1910.

Fars (Farsistan). Witherby, H. F. 1903.

Western Persia. Sarudny, N. A. & Härms, M. 1913; Witherby, H. F. 1907b.

Siam

General. Gyldenstolpe, N. C. 1916, 1920; Kloss, C. B. 1918; Lowe, W. P. 1933; *Riley, J. H. 1938; Robinson, H. C. 1931.

Salang Island. Müller, A. 1882.

Southeastern coasts and islands. Robinson, H. C. 1915.

Southern Laos. Engelbach, P. 1932.

MALAY PENINSULA

General. Kelham, H. R. 1881; *Riley, J. H. 1938.

Langkawi and Terutau Islands. Robinson, H. C. & Kloss, C. B. 1910.

Siberia

General. Jones, K. H. 1909; Seebohm, H. 1878, 1882a; Sievertsov, N. A. 1873.

Altai Mountains, and adjacent parts of northwestern Mongolia. Book. Text in Slavic. Sushkin, P. P. 1938.

Anadyr region. Belopolski, L. 1933.

Northeastern Siberia. Hersey, F. S. 1916.

Tobolsk. Bianchi, V. L. 1922.

Tundra region. Pleske, T. D. 1928.

Wrangell Island. Snyder, L. L. 1926.

Yenisei River region. Popham, H. L. 1901.

EASTERN SIBERIA

General. Dörries, F. 1888; Homeyer, E. F. 1868.

Arctic coast. Thayer, J. E. & Bangs, O. 1914.

Lena River mouth region. Hartert, E. J. 1904.

Tibet

General. Pelzeln, A. 1868.

Gyantse region. Ludlow, F. 1927.

Southern Tibet. Walton, H. J. 1906.

Western Tibet. Whistler, H. 1923a.

Transbaikalia

Book. Text in Slavic. Kozlova, E. V. 1930.

Southwest Transbaikalia. Kozlova, E. V. 1932.

Turkey

General. Elwes, H. J. & Buckley, T. E. 1870.

Erzerum. McGregor, J. G. 1917.

Islands of Milos, Lemnos, and Imbros. Stenhouse, J. H. 1920.

ASIA MINOR

General. Braun, F. 1908d; Danford, C. G. 1877, 1880; Kummerlöwe, H. & Niethammer, G. 1934; Weigold, H. 1914.

Anatolian Plateau. Ramsay, L. N. 1914.

Armenia. Witherby, H. F. 1907b.

EUROPE

Books. Text in English. Dresser, H. E. 1871-96; Ramsay, R. G. 1923.

Text in French. Degland, C. D. 1849; Des Murs, M. A. 1886. Falconiformes & Strigidae. Madon, P. 1933.

Text in German. Arnold, F. 1897; Friderich, C. G. 1923; Gloger, C. W. 1834. Central Europe. *Heinroth, O. & Heinroth, M. 1924, 1924-28.

General. Sievertsov, N. A. 1873.

Aegean Sea area. Harrison, J. M. 1925.

Baltic Sea region. Bianchi, V. L. 1926.

Montenegro. Lilford, B. 1860.

Pyrenees Mountains. Saunders, H. 1897. Central Pyrenees Mountains. Wallis, H. M. 1895. Western and central Pyrenees. Whistler, H. & Harrison, J. M. 1930.

Austria

Bocche di Cattaro. Kolibay, P. R. 1904.

Bohemia. Fritsch, A. 1871.

German-Bohemian mountain chain. Peiter, W. 1899, 1900. Elbe Valley. Peiter, W. 1900.

Southern Dalmatian province. Kolibay, P. R. 1916b.

Belgium

General. Dubois, A. J. 1912b; Havre, G. C. 1928.

Scheldt River region. Book. Text in French. Quinet, A. 1897.

British Isles

Books. Text in English. Butler, A. G. 1896-98; Coward, T. A. 1920; Hachisuka, M. 1925; Lilford, B. 1891-98; Witherby, H. F. & others 1920-24. Aquatic birds. Patten, C. J. 1906. Muscicapidae. Howard, H. E. 1907-15. Passeriformes. Wyatt, C. W. 1894-99. Song birds. Nash, J. 1872.

Ireland. Book. Text in English. Ussher, R. J. & Warren, R. 1900.

CHANNEL ISLANDS

Book. Text in English. Smith, C. 1879.

Alderney. Clarke, W. E. 1899b; Thompson, W. R. 1921.

Sark. Howard, H. E. 1902.

GREAT BRITAIN

Books. Text in English. Atkinson, J. 1820; Gould, J. 1862-73; Hudson, W. H. 1895. Check list. Witherby, H. F. & others 1920-24.

Isle of Man. Book. Text in English. Ralfe, P. G. 1905.

England

Kent. Ticehurst, N. F. 1909.

Suffolk County. Book. Text in English. Ticehurst, C. B. 1932.

Sussex. Book. Text in English. Walpole-Bond, J. A. 1938.

Scotland

Isle of May. Entrance to Firth of Forth. Baxter, E. V. & Rintoul, L. J. 1918.

Isle of Raasay. Collier, C. 1909.

Moray Basin. Includes birds. Book. Text in English. Harvie-Brown, J. A. & Buckley, T. E. 1895.

Bulgaria

General. Finsch, O. 1859.

East Bulgaria. Harrison, J. M. 1933.

Finland

Book. Text in Finnish. Hortling, I. J. 1929.

General. Bianchi, V. L. 1926; Nordmann, A. 1864.

Heinäsaaret Island, Arctic coast of Finland. Emeis, W. 1929.

Nothamn. Nyberg, E. 1915.

Southern Finland. Palmgren, P. 1928, 1930.

France

Books. Text in French. Ménégau, H. A. 1932; Paris, P. 1921.

General. Legendre, M. 1926.

Ancre Valley. Kennedy, J. N. 1917a.

Brittany. Clarke, W. E. 1899b.

Camargue Island. Glegg, W. E. 1931.

Central and northeast France. Cretté de Palluel, A. 1899b.

Effects of world war. Kennedy, J. N. 1917a.

Marne district. Book. Text in French. Lescuyer, J. F. 1878a.

Northeast France. Schuster, L. 1921.

Pyrénées-Orientales. Ticehurst, C. B. 1927.

Rhone River Delta. Clarke, W. E. 1895.

Ushant Island. Clarke, W. E. 1899b.

Var district and vicinity. Gurney, J. H. Jr. 1901.

Germany

Books. Text in German. Brehm, C. L. 1820-22; Müller, A. & Müller, K. 1897.

Anhalt. Pässler, C. W. 1861.

Brandenburg Lowlands. Book. Text in German. Schalow, H. 1919.

Eastern Erz Mountains. Heyder, R. 1913.

Ems River region. Detmers, E. 1911. Upper Ems region. Peitzmeier, J. 1925.

German-Bohemian mountain chain. Peiter, W. 1899. Elbe Valley. Peiter, W. 1900.

Greifswald. Koske, F. 1919.

Helgoland Island. Weigold, H. 1925.

Hessen-Nassau province. Hagen, W. 1916.

Hildesheim province. Lachmund, F. 1876a.

Magdeburg province. Nathusius, G. 1925.

Münster province. Reichling, H. 1917. Changes in 60 years. Koch, R. 1924.

Neu-Vorpommern. Holtz, L. 1865.

Pomerania province. Koske, F. 1917; Krüper, T. J. 1853.

Posen. Hammling, J. & Schulz, K. 1911.

Prussia. Geyr von Schweppenburg, H. 1913.

Rügen and neighboring islands. Fall fauna. Schilling, H. 1853.

Saxony. Heyder, R. 1916, 1922.

Schlesien. Kayser, C. 1914.

Zobten. Knauthe, K. 1888.

Greece

General. Parrot, C. P. 1905a.

Acarmania province. Lilford, B. 1860.

Cyclades Islands. Krüper, T. J. 1863.

Ionian Islands. Lilford, B. 1860.

Struma Plain. Chasen, F. N. 1921.

Holland *see* The Netherlands

Hungary

Book. Text in Hungarian. Gyula, M. 1903.

General. Schenk, J. 1918.

Puszt-Hortobagy. Nagy, E. 1924.

Siebenbürgen (Transylvania). Zeyk, N. 1920a.

Iceland

Books. Text in Danish. Dinesen, G. B. 1926; Schiøler, E. L. 1925-31.

Text in German. Iceland and adjacent islands. Hantzsch, B. 1905.

Italy

Books. Text in Italian. Arrigoni degli Oddi, E. 1904, 1929; Giglioli, E. H. 1907; Martorelli, G. 1895a; Savi, P. 1873-76.

General. Giglioli, E. H. 1881.

Island of Capri. Koenig, A. F. 1886.

Isle of Pantelleria. Steinfatt, O. 1934.

Naples district. Tucker, B. W. & van Oordt, G. J. 1929. Phlegraean Plain included. Tucker, B. W. 1927.

Padua province. Arrigoni degli Oddi, E. 1894b.

Southern Venice and coastal regions. Tratz, E. P. 1919.

Jugoslavia

General. Ticehurst, C. B. & Whistler, H. 1929.

Bosnia. Reiser, O. 1888.

Syrmien. Geyr von Schweppenburg, H. 1915.

Lapland

General. Nordmann, A. 1864; Pässler, C. W. 1853.

RUSSIAN LAPLAND

Book. Text in English. Pearson, H. J. 1904.

General. Pearson, H. J. 1896.

Kola Peninsula. Witherby, H. F. 1900.

Murman Coast. Pearson, H. J. 1899.

Latvia

General. Goebel, H. 1873a.

Lithuania

General. Sachtleben, H. 1922a.

The Netherlands

Books. Text in Dutch. Schlegel, H. 1859; van Oort, E. D. 1922-35; van Oordt, G. J. & Verwey, J. 1925.

General. van Oort, E. D. 1908.

Texel Island. Ticehurst, C. B. 1920.

Poland

General. Hammling, J. 1918; Taczanowski, W. 1888.

Galicja. Prażák, J. P. 1897a.

Region of Janowitz. Szulczewski, A. 1910.

Portugal

Book. Text in English. Tait, W. C. 1924.

General. Rey, J. G. 1872c; Smith, A. C. 1868c; Tait, W. C. 1887; Ticehurst, C. B. 1935b; Ticehurst, C. B. & Whistler, H. 1933.

Roumania

Transylvania (Siebenbürgen). Dandford, C. G. & Brown, J. A. 1875.

Russia

Books. Text in French and Slavic. Bogdanow, M. N. 1884.

Text in German and Slavic. Pleske, T. D. 1889-92.

General. Goebel, H. 1870. Falconiformes. Stegmann, B. C. 1937.

Astrakhan province. Seebohm, H. 1882b.

Kiev province. Goebel, H. 1870.

Kolguev Island. Pearson, H. J. 1896.

North Russia. Bianchi, V. L. 1926.

Nova Zembla Island. Gillett, G. 1870; Heuglin, M. T. 1872; Jordans, A. 1925; Pearson, H. J. 1896.

Orenburg province, southern region. Grote, H. 1920.

Pripet River swamps. Zedlitz, O. 1920.

South Russia. Kennedy, J. N. 1921.

Transcaucasia province. Buturlin, S. A. 1906.

Tundra region. Pleske, T. D. 1928.

Ural region. Clerc, W. O. 1910.

Volga River Delta and adjacent steppes. Worobiew, K. A. 1929.

Waigats Island. Heuglin, M. T. 1872.

Scandinavia

Book. Text in Swedish. Kolthoff, G. I. & Jägerskiöld, L. 1898.

DENMARK

Book. Text in Danish. Schiøler, E. T. 1925-31.

General. Elwes, H. J. 1880; Hørring, R. 1926; Skovgaard, P. 1933c.

Amager Island. Skovgaard, P. 1913-14.

Esbjerg region. Skovgaard, P. 1914, 1915.

Rold forest. Skovgaard, P. 1912.

NORWAY

Bodö. Godman, F. D. & Godman, P. 1861.

Finmarken. Heuglin, M. T. 1871.

Western Norway. Stejneger, L. 1907.

SWEDEN

Book. Text in Swedish. Sundevall, C. J. 1856-57.

General. Zedlitz, O. 1925.

Island of Oland. Wahlgren, E. 1917.

Isle of Gottland. Holtz, L. 1866.

Jemtland province. Meves, F. W. 1860.

Muonio River. Davies, S. A. 1905.

Spain

General. Lilford, B. 1866.

Andalusian Sierras. Lynes, H. 1912a.

Cantabrian Mountains. Witherby, H. F. 1922a.

Central and southern Spain. Witherby, H. F. 1928.

Eastern Spain. Ticehurst, C. B. & Whistler, H. 1930.

Galicja. Ticehurst, C. B. 1928.

Malaga. Boxberger, L. V. 1934.

Navarre. Ticehurst, C. B. & Whistler, H. 1925.

Southern Spain. Saunders, H. 1871;
Stenhouse, J. H. 1921.

Switzerland

Books. Text in French. Knopfi, W.
& Burg, G. 1930.

Text in German. Studer, T. & Fatio,
V. 1889-1938.

Alps in winter. Watson, J. B. 1929b.

Lake of Geneva. Kennedy, J. N.
1923.

Turkey

Albania province. Lilford, B. 1860.

Constantinople. Sclater, P. L. &
Taylor, E. C. 1876.

Monastir province. McGregor, J. G.
1906.

MACEDONIA

Book. Text in English. *Stresemann, E. 1920.

General. Fehring, O. 1922; Glegg,
W. E. 1924; Harrison, J. M. 1925;
Schlegel, R. 1918; Sladen, A. G. 1917.

MEDITERRANEAN SEA REGION

Book. Text in German. Hartert,
E. J. 1903-22.

General. Lilford, B. 1887; Lynes, H.
1912b; Müller, J. W. 1856.

Corsica Island. Jourdain, F. C. 1911;
Payn, W. A. 1927; Wharton, C. B. 1876;
Whitehead, J. 1885.

Crete Island. Meinertzhagen, R.
1921a.

Cyprus Island. Bucknill, J. A. 1909.

Gozo Island. Wright, C. A. 1864.

Malta Island. Despott, G. 1917;
Wright, C. A. 1864.

Sardinia Island. Brooke, A. B. 1873;
Salvadori, A. T. 1865. Book. Text in
Italian. Martorelli, G. 1884.

Straits of Gibraltar. Book. Text in
English. Irby, L. H. 1895.

Balearic Islands

General. Munn, P. W. 1926.

Mallorca (Majorca) Island. Jordans,
A. 1924. Alcudia. Munn, P. W. 1921.

Minorca Island. Munn, P. W. 1924.

Pityusae Islands. Ticehurst, C. B. &
Whistler, H. 1930.

OCEANICA

Australia

Books. Text in English. Gould, J.
1865; Lucas, A. H. & Le Souëf, W. H.
1911; Mathews, G. M. 1910-28; Wol-
stenholme, H. 1926.

General. White, S. A. 1914.

Abrolhos or Houtman's Rocks.
Alexander, W. B. 1922; Cosgrave, C. P.
1916.

Alexander district, North Territory.
Ingram, C. 1907a.

Dirk Hartog Island. Carter, T. 1917.

Melville Island. Mathews, G. M.
1914a.

Peron Peninsula. Carter, T. 1917.

South Australia. Eylmann, E. 1911,
1914.

Tasmania. Hutton, F. W. 1865.
Book. Text in English. Littler, F. M.
1910a.

Victoria. Mattingley, A. H. 1909.

Western Australia. Carter, T. 1920;
Hall, R. 1902; Ogilvie-Grant, W. R.
1910c.

NEW SOUTH WALES

Book. Text in English. Lewin,
J. W. 1838.

Mermot, Barrington. Hyem, E. L.
1936.

Sidney. Hutton, F. W. 1865; Ram-
say, E. P. 1863.

NORTH QUEENSLAND

Cooktown and neighborhood of
Cairns. Robinson, H. C. & Laverock,
W. S. 1900.

Inkerman Station. Ingram, C. 1908b.

Richmond district. Berney, F. L.
1905.

Hawaiian (Sandwich) Islands

Books. Text in English. Rothschild,
L. W. 1893-1900; Wilson, S. B. &
Evans, A. H. 1890-99. Includes birds.
Bryan, W. A. 1915.

General. Caum, E. L. 1933; Perkins,
R. C. 1895, 1901; Wilson, S. B. 1890.

Laysan Island. Dill, H. R. 1912;
Fisher, W. K. 1903a, b. Includes

neighboring islands. Book. Text in English. Rothschild, L. W. 1893-1900.

Leeward Islands. Fisher, W. K. 1903a.

Midway Island. Mearns, E. A. 1909.

Malaysia

Book. Text in Dutch. Schlegel, H. 1863-66.

General. Wallace, A. R. 1865.

Alor and Lomblen islands. Rensch, B. 1929.

Anambas Islands. Oberholser, H. C. 1917b.

Bawean Island. Oberholser, H. C. 1917c.

Natuna Islands. Oberholser, H. C. 1932.

Tambelan Islands. Oberholser, H. C. 1919b.

Timor Island. Wallace, A. R. 1861.

BORNEO

General. Mearns, E. A. 1909; Sharpe, R. B. 1876-77.

Lumbidan province. Sharpe, R. B. 1879.

Mount Dulit and Baram district. Hose, C. 1893.

Northeast Borneo. Elliot, D. G. 1891. Coast islands. Riley, J. H. 1930b.

Northern Borneo. Sharpe, R. B. 1887, 1890; Walden, A. 1872.

CELEBES

General. Blasius, W. 1885a; Meyer, A. B. 1879; Riley, J. H. 1918; Walden, A. 1874.

Celebes and neighboring islands. Book. Text in English. Meyer, A. B. & Wigglesworth, L. W. 1898.

Northern Celebes. Wallace, A. R. 1860.

JAVA

Book. Text in English. Kuroda, N. 1933.

General. Finsch, O. 1906; Nicholson, F. 1881.

Java Sea islands. Oberholser, H. C. 1917a.

Western region. Nicholson, F. 1879.

PHILIPPINE ISLANDS

Books. Text in English. Hachisuka, M. 1929, 1931; McGregor, R. C. 1909-10; McGregor, R. C. & Worcester, D. C. 1906.

General. Bourns, F. S. & Worcester, D. C. 1894; McGregor, R. C. 1903, 1920; Mearns, E. A. 1909; Ogilvie-Grant, W. R. 1895a, 1906a; Steere, J. B. 1891; Whitehead, J. 1899; Worcester, D. C. & Bourns, F. S. 1898.

Balábac Island. Everett, A. H. 1895.

Benguet province, Luzon Island, also islands of Mindoro, Lubang, Cuyo and Cagayancillo. McGregor, R. C. 1904.

Mindanao. McGregor, R. C. 1909. Southeast region. Ogilvie-Grant, W. R. 1906a.

Palawan Island. Everett, A. H. 1895; Lowe, W. P. 1916; Worcester, D. C. & Bourns, F. S. 1898.

Sulu Archipelago. Sharpe, R. B. 1894.

SUMATRA

General. Oberholser, H. C. 1912; Stone, W. 1902; Stresemann, E. 1921b.

Acheen. Snouckaert van Schauburg, R. C. 1922.

Barussan Islands. Oberholser, H. C. 1912.

Pulo Taya, Berhala Strait. Oberholser, H. C. 1919c.

Simalu Island. Oberholser, H. C. 1919d.

Southeastern Sumatra. Nicholson, F. 1882.

Melanesia

Book. Text in Dutch. Schlegel, H. 1863-66.

General. Murphy, R. C. & others 1924-39.

Loyalty Islands. Layard, E. L. 1880a. Book. Text in German. Sarasin, C. F. 1913a.

Molucca Islands. Book. Text in Italian. Salvadori, A. T. 1880-82. Northern Molucca Islands. Wallace, A. R. 1862.

New Caledonia. Book. Text in German. Sarasin, C. F. 1913a.

New Hebrides. Sharpe, R. B. 1900.

Solomon Islands. Tristram, H. B. 1882.

Talaut Islands. Meyer, A. B. & Wigglesworth, L. W. 1894.

Tanah Jampea and neighboring islands. Meise, W. 1929.

BISMARCK ARCHIPELAGO

General. Heinroth, O. 1902.

Feni and Nissan islands. Hartert, E. J. 1926b.

French Islands. Hartert, E. J. 1926c.

EAST INDIES

Lihir group. Meyer, O. 1934.

New Britain. Talasea. Hartert, E. J. 1926a.

New Hanover. Hartert, E. J. 1899a.

NEW GUINEA

Books. Text in English. Gould, J. & Sharpe, R. B. 1875-88.

Text in Italian. Salvadori, A. T. 1880-82.

General. Rosenberg, G. 1864; Stresemann, E. 1923c.

Kaiser Wilhelm Land. Reichenow, A. 1897a.

Northeastern New Guinea (Papua) coastal range between Markham and Waria rivers. Greenway, J. C. 1935.

Northwestern New Guinea. Hartert, E. J. 1930.

Western New Guinea. Ogilvie-Grant, W. R. 1913b, 1915b.

Micronesia

Caroline Islands. Kusai (Strong) Island. Finsch, O. 1880a.

Guam Island. Mearns, E. A. 1909.

Marcus Island. Bryan, W. A. 1903.

Ponapé Island. Finsch, O. 1880b.

New Zealand

Books. Text in English. Buller, W. L. 1882, 1888; Oliver, W. R. 1930; Stead, E. F. 1932.

General. Buller, W. L. 1874, 1895a; McLean, J. C. 1907; Mathews, G. M. 1913; Nutting, C. C., Wylie, R. B., Thomas, A. C., & Stoner, D. 1924.

Include adjacent islands. Gray, G. R. 1862; Ogilvie-Grant, W. R. 1905b.

Kermadec Islands. Iredale, T. 1914.

Nelson province. Haast, J. 1862.

Polynesia

General. Murphy, R. C. 1924c; Murphy, R. C. & others 1924-39; Townsend, C. H. & Wetmore, A. 1919.

Fiji Islands. Bahr, P. H. 1912b; Layard, E. L. 1876a, b; Nutting, C. C., Wylie, R. B., Thomas, A. O., & Stoner, D. 1924; Wood, C. A. & Wetmore, A. 1925.

Henderson Island. Ogilvie-Grant, W. R. 1913d.

Lord Howe and Norfolk islands. Book. Text in English. Mathews, G. M. 1928.

Samoa Islands. Finsch, O. 1872; Whitmee, S. J. 1875a.

Tahiti Island. Wilson, S. B. 1907.

Tonga Islands. Finsch, O. & Hartlaub, C. J. 1870.

FEATHERS

For colors of feathers and feather pigments see under **Coloration**. See also under **Growth**, **Plumage**, **Integument**, and **Sex**.

Books. Text in Danish. *Phasianus*. Heilmann, G. 1916a.

Text in English. *Anas*. Allen, G. M. 1925; Aristotle 1868; Reynolds, S. H. 1897.

Text in French. Jammes, L. 1904; Malmont, H. M. 1866; Milne-Edwards, A. & Grandidier, A. 1879-81; Montillot, J. M. 1891.

Text in German. Camper, P. 1793; Gadow, H. F. 1891d; Stresemann, E. 1927-34.

Text in Latin. Fabricius ab Aquapendente, H. 1618b.

General. Bräss, M. 1886; Meijere, J. C. 1895; Anon. 1878.

Cochleariidae. Murie, J. 1872b. *Coracias*. Sharpe, R. B. 1871. *Corvus*. Hartert, E. J. 1901. *Eurypygidae*. Murie, J. 1872b. *Larus melanocephalus*. Ninni, A. P. 1883. *Leptosoma discolor*. Selater, P. L. 1865c. *Rhea*. Zander, R.

1889. Rhinocetidae. Murie, J. 1872b. *Somateria spectabilis*. Norton, A. H. 1900. Sphenisciformes. Lowe, P. R. 1933a. *Struthio*. Duerden, J. E. 1919e, 1920c; Lowe, P. R. 1928; Nolte, C. W. 1895.

Adaptation to function. *Circus*. Chandler, A. C. 1914b.

Age indication. *Dendragapus*. van Rossem, A. J. 1925.

Bifurcated feathers. Rutherford, W. J. 1902-03.

Breeding to increase number. *Struthio*. Duerden, J. E. 1918.

Chemical composition. Different age stages. Weiske, H. 1889.

Classification. Montessus, F. B. 1886.

Diastaxy or aquintocubitalism. Apparent absence of fifth remex in some groups of birds. See Pycraft, W. P. 1910a, pp. 409-410 for explanation of this condition. Bates, G. L. 1923; *Pycraft, W. P. 1899d, 1902a; *Steiner, H. 1916. Alcedinidae. Mitchell, P. C. 1901b. Columbidae. *Mitchell, P. C. 1899.

Double-shafted feathers. *Pavo*. Giebel, C. G. 1869.

Electrically charged feathers. Mayer, J. 1782; Hugo, L. A. 1876. *Psittacus*. Exner, S. 1895; Hartmann, J. F. 1770.

Evolution and phylogeny. Bornstein, F. 1912; Duerden, J. E. 1923; Ewart, J. C. 1921; Gadow, H. F. 1912a; Keibel, F. 1896. *Struthio*. Duerden, J. E. 1922.

Fluids in lumen of quills. *Columba*, *Gallus*, & *Meleagris*. Lewis, G. A. 1870.

Function. *Cyanocitta cristata*. Peck, M. E. 1900.

Hollow-shafted feathers. *Bucorax*. Webb, W. M. 1914.

Iron content. Hodek, E. 1883. *Gypaëtus*. Homeyer, E. F. 1883b. *Gypaëtus barbatus*. Krukenberg, C. F. 1883a.

Light effects on feathers. Cartwright, B. W. & Harrold, C. G. 1925; Pucheran, J. 1844.

Monoamino acids content. *Anser*. Abderhalden, E. & Le Count, E. R. 1905.

Nutrition of feathers. Poupart, F. 1732; Rostan, E. M. 1762.

Oil of feathers. Origin. *Anas*. Joseph, M. 1891.

Photographs of feathers. Gladstone, J. S. 1918b.

Regeneration. Bornstein, F. 1912; Dutrochet, H. 1819b; Samuel, S. 1870.

Ricin in quills. *Numenius*. Trouesart, E. L. 1886.

Ruffling of feathers. Mechanism. *Columba*. Langley, J. M. 1902.

Use as currency. Waite, E. R. 1927.

ABNORMAL AND DEFECTIVE FEATHERS

General. Holland, T. 1864. *Columba*. Luck, V. 1856. *Miliaria*. Angelini, G. 1915. *Struthio*. Duerden, J. E. 1907b, 1912d, 1920d.

Abrasion or wear of feathers. See also under Coloration: Abrasion or wear of feathers. Dwight, J. 1905. *Fringilla*. Görnitz, K. 1927.

Damage to feathers by other birds. *Pomatorhina*. Barrington, R. M. 1915.

Degeneration due to disease. *Columba*. Otto, Herman 1910.

Perforations of parasitic origin. *Columba*. Henry, — & Leblois, —. 1923.

Scaliness and failure of germs to open. *Struthio*. Duerden, J. E. 1907b.

Fault bars

Causes. *Struthio*. Duerden, J. E. 1909d, e.

Development. *Columba*. Riddle, O. 1908b. *Turtur* hybrid. Strong, R. M. 1902a.

DEVELOPMENT

Books. Text in German. Gadow, H. F. 1891d; Schneider, K. C. 1902; Stresemann, E. 1927-34. *Gallus*. Maurer, F. 1895.

General. Alix, H. E. 1865; Bornstein, F. 1912; Cuvier, F. G. 1834; *Davies, H. R. 1888, 1889; Engel, Johannes 1857; Fatio, V. 1866; Ficalbi, E. 1891; Keibel, F. 1896; Kingsley, J. S. 1897; Klee, R. 1886; Kosmak, G. W. 1894; Kuhn, O. 1928b; Lvov, V. N. 1884; Meckel, A. 1815; Montessus, F. B. 1886; Poupart, F. 1732; Reclam, C.

H. 1847; Samuel, S. 1870; Schleidt, J. 1913; Schrenk, G. 1848; Stieda, C. H. 1889; Studer, T. 1873; Voronin, V. V. 1894. Many species. Holland, T. 1860, 1864.

Anas. Jeffries, J. A. 1883b; Kuhn, O. 1930. *Aquila*. Sushkin, P. P. 1896a. *Coccyzus*. Herrick, F. H. 1910b. *Columba*. Reclam, C. H. 1846; *Strong, R. M. 1902b; Waldeyer, H. W. 1882. *Eudyples*. Studer, T. 1877, 1878. *Gallus*. Hennicke, C. R. 1889b; Jeffries, J. A. 1883b; Pearl, R. & Boring, A. M. 1914; Reclam, C. H. 1846; Remak, R. 1848; Stieda, C. H. 1869b; Strong, R. M. 1917c; Studer, T. 1877, 1878. (Polish fowl.) Klatt, B. 1910. (Silver-spangled fowl.) Landauer, W. & Dunn, L. C. 1930b. *Megapodius*. Studer, T. 1877, 1878. *Melospittacus*. Ghigi, A. 1907b. *Munia* & *Passerina*. *Strong, R. M. 1902b. *Pica caudata*. Raspail, X. 1896a. *Rhinoplax vigil*. Wetmore, A. 1915c. *Sphenisciformes*. Kerbert, C. 1877. *Sterna*. *Strong, R. M. 1902b. *Struthio*. Duerden, J. E. 1913, 1922. *Turacus*. Pycraft, W. P. 1904b. *Turtur* [*Streptopelia*] hybrid. Strong, R. M. 1902a.

First description. Book. Text in Latin. Malpighi, M. 1697.

Pattern development. *Gallus*. *Lillie, F. R. & Juhn, M. 1932. *Numida*. Hardesty, M. 1933.

Relation in development to other integumental structures. Davies, H. R. 1889.

Shaft and quill included. *Anas*, *Anser*, & *Meleagris*. *Meckel, A. 1815.

Silky and woolly feathers. *Gallus*. Taubert, F. 1910.

Taxonomic significance. Chigi, F. 1908.

Continuity in development of feather with preceding feather

General. Kleinschmidt, O. 1903.

Continuity of nestling and definitive feathers. Landois, H. 1888a. Many species. Schaub, S. 1912; *Anas*. Ewart, J. C. 1921. *Chunga*. Schaub, S. 1914. *Columba*. Reclam, C. H. 1846. *Erismatura*. Coues, E. B. 1878d. *Gallus*. Reclam, C. H. 1846; Taubert, F. 1910. *Mesites*, *Psophia*, & *Rhinocetus*. Schaub, S. 1914.

Continuity at second autumnal molt. *Columba*. Jackson, A. C. 1913a.

Development of various parts

Blood vessel development in feather germ. *Gallus*. Peska, W. 1927.

Epidermal fibrillae in feathers. Histogenesis. Role of chondriosomes. *Gallus*. Firket, J. 1911.

Experimental modification of development

General. *Struthio*. Duerden, J. E. 1918.

FEEDING EFFECTS

General. *Struthio*. Bassermann, W. 1911.

Thymus gland extract. *Columba* & *Gallus*. Kříženecký, J. 1927b. *Gallus*. Kříženecký, J. & Nevalonnyj, M. 1927, 1929.

Vitamin B. See also under Vitamins. Kříženecký, J. & Petrov, I. 1926.

GRAFTS

Development of feather primordia in embryo grafts. *Gallus*. Hoadley, L. 1926a.

Resemblance to donor. *Gallus*. Danforth, C. H. & Foster, F. 1927.

HORMONE EFFECTS

See also under Reproduction and Thyroid gland.

General. Kříženecký, J. & Podhradský, J. 1926.

Hyperthyroidism. Effect of feeding thyroid gland on development and pigmentation. Horning, B. & Torrey, H. B. 1923, 1927; Podhradský, J. 1926. *Columba*. Zawadowsky, B. M. 1926. *Gallus*. Juhn, M. & Fraps, R. M. 1934; Kříženecký, J. 1926a, 1927a, b; Kříženecký, J. & Nevalonnyj, M. 1929; Kuhn, O. 1928a; Schwarz, E. 1931; Torrey, H. B. & Horning, B. 1925a, b, c; Zawadowsky, B. M. 1926; Zawadowsky, B. M. & Rochlin, M. 1928. *Pavo*. Zawadowsky, B. M. 1926.

Sex hormone effects

General. *Gallus*. Juhn, M., Faulkner, G. H., & Gustavson, R. G. 1931; Kuhn, O. 1928a.

Female sex hormones

General. *Gallus*. Lillie, F. R. 1932b; Lillie, F. R. & Juhn, M. 1932.

Action of female hormone on capon feathers. Juhn, M. & Gustavson, R. G. 1930a.

Growth

General. Schlegel, H. 1853a, 1855a. *Amazilia t. tzacatl*. Skutch, A. F. 1931. *Carpodacus*. Keeler, C. A. 1890. *Chordeiles*. Bowles, J. H. 1921. *Ciconia alba*. Schmidt, M. 1868b. *Cryptoglaux acadica*. Terrill, L. M. 1931. *Gallus*. Chodziesner, M. 1929. *Pica caudata*. Raspail, X. 1896a.

Climatic change effects. *Struthio*. Duerden, J. E. 1907b.

Forced regeneration effects. *Gallus*. Dunn, L. C. & Landauer, W. 1930.

Normal and experimental conditions compared. Gliozzi, S. 1926.

Rate of growth. Heinroth, O. 1906b. *Anas*, *Anser*, & *Columba*. Streich, G. & Swetosarov, E. 1937. *Gallus*. Holmes, A. 1935; Lillie, F. R. 1932a; *Lillie, F. R. & Juhn, M. 1932; Martin, J. H. 1929b; Streich, G. & Swetosarov, E. 1937. *Numida*. Hardesty, M. 1933. *Struthio*. Duerden, J. E. 1907b.

Regeneration. *Gallus*. Landauer, W. 1930b.

HISTOLOGY AND GENERAL STRUCTURE

See also under **Coloration**.

Books. Text in English. Leeuwenhoek, A. 1816, vol. 1, pp. 271-274, pl. 9; Parker, T. J. & Haswell, W. A. 1897.

Text in French. Cornevin, C. E. 1895. Good figures. Mandl, L. 1838. *Anas* & *Argus*. Nietzsche, C. L. & Burmeister, C. C. 1840. *Struthio*. Perrault, C. 1671.

Text in German. Engelmann, F. 1928; Gadow, H. F. 1891d; Schwann, T. 1839. Excellent figures. *Columba*. *Krause, R. 1922.

Text in Latin. Leeuwenhoek, A. 1722, pp. 287-291.

General. Aclouque, A. 1909; Alix, H. E. 1865; Brooks, W. K. 1874; Carlisle, G. C. 1925; Clément, E. C. 1876; Cuvier, F. G. 1834; Dutrochet, H. 1819b; Elsässer, T. 1925; Ewart, J. C. 1921; Fatio, V. 1866; Gladstone, J. S. 1918a, b; Gragert, R. 1925; Gundlach, J. C. 1837; *Haecker, V. 1890; Holland, T. 1861, 1864; Janda, V. 1929; Kingsley,

J. S. 1897; Klee, R. 1886; Ladebeck, E. 1923; Lvov, V. N. 1884; Macgillivray, W. 1827; Mascha, E. 1903a, b; Meijere, J. C. 1895; Montessus, F. B. 1886; Poupart, F. 1732; Pycraft, W. P. 1893a; Reichenbach, H. G. 1855; Sappey, M. P. 1893; Wray, R. S. 1887c. Many species. *Mascha, E. 1904; Schroeder, R. 1880.

Alcedo. Stubbs, F. J. 1910a. *Anas*. Niemann, H. 1925. *Anser*. Niemann, H. 1925; Rondelli, M. 1924. *Aptenodytes* & *Casuarus*. Marshall, W. A. 1875. *Columba*. Lewis, G. A. 1871b; Oels, —, 1913; Reclam, C. H. 1846; Stieda, C. H. 1872, 1889; Strong, R. M. 1902c, 1903. *Corvus corax*. Kleinschmidt, O. & Hartert, E. J. 1901. *Cotinga*. Strong, R. M. 1902b. *Cyanocitta cristata*. Peck, M. E. 1900; Strong, R. M. 1902b. *Didus*. Moseley, H. N. 1885. *Dinornis*. Dallas, W. S. 1865. *Dromiceius*. Marshall, W. A. 1875. *Eudypetes*. Studer, T. 1877. *Gallus*. Reclam, C. H. 1846; Rondelli, M. 1924; Stieda, C. H. 1869b; Studer, T. 1877; Taubert, F. 1910. *Loxia coccythraustes*. Szeliga-Mierzeyewski, W. 1927. *Megapodius*. Studer, T. 1877. *Pitta*. Strong, R. M. 1902b. *Podiceps*. Pycraft, W. P. 1907h. *Ratitae*. Hutten, F. W. 1872b. *Sialia*. Strong, R. M. 1902b. *Spheniscidae*. Pycraft, W. P. 1907g. *Streptopelia*. Strong, R. M. 1902a, b, c. *Strigidae*. Quekett, J. T. 1849a. *Struthio*. Marshall, W. A. 1875; Perrault, C. 1672, 1733a. *Turacus macrorhynchus*. Pycraft, W. P. 1904b.

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Popular article. Many species. Martin, B. W. 1902.

Significance of feather structure in criminology. Kockel, R. 1909.

Taxonomic significance of feather structure. *Chandler, A. C. 1916; Goepfert, W. 1925.

MUSCULATURE. CONSISTS OF SMOOTH MUSCLE

General. *Helm, A. F. 1884; Jacquemin, E. 1836c; *Langley, J. N. 1904; Seuffert, L. 1862, 1863. *Pelecanus*. Méry, J. 1730. *Sphenisciformes*. Lowe, P. R. 1933a.

Cerebral cortex center for feather muscles. *Anas* & *Gallus*. Weber, E. 1906.

Head crest feathers. *Meleagris*. Jegorow, J. 1890.

Innervation of head crest feather muscle. *Meleagris*. Jegorow, J. 1890.

Muscles of individual feathers and of an entire tract. Helm, A. F. 1886.

NEOSSOPTYLES (NESTLING DOWN FEATHERS)

General. Dunlop, E. B. 1911c; Leigh, A. G. 1909; Ticehurst, C. B. & Leigh, A. G. 1909. Many species. Ticehurst, C. B. 1908a. Anatidae. Jackson, A. C. 1918a. *Centurus aurifrons santacruzi*. Scharnke, H. 1930a. Falcones. Ingram, C. 1921. *Motacilla*. Ticehurst, C. B. 1921b. *Phalacrocorax*. Ticehurst, C. B. 1922b. *Pterocles*. Ticehurst, C. B. 1921a, b, 1922a. *Spheniscidae*. Ingram, C. 1920. *Spheniscidae*. Pycraft, W. P. 1907g. *Sterna*. Ticehurst, C. B. 1921b. *Turacus*. Pycraft, W. P. 1904b.

Structure. Pernitzka, E. 1871. Many species. Schaub, S. 1912. *Anas*. *Ewart, J. C. 1921. *Columba*. Kordoss, G. 1908.

Papilliform neossoptyles on forehead. Structure and development. *Fulica atra*. Steinbacher, G. 1930.

Development

General. Jones, L. 1907b; Poupart, F. 1732; Reclam, C. H. 1847. *Anas*. *Lamont, A. 1922. Ardeidae. Schaub, S. 1908. *Coccyzus*. Herrick, F. H. 1910b. *Columba*. Kordoss, G. 1908. *Eudypetes*. Studer, T. 1877, 1878; *Wohlauer, E. 1902. *Fulica*. Ghigi, A. 1905a, 1907b. *Gallus*. Glasewald, F. K. 1926; Pernitzka, E. 1871; Studer, T. 1877, 1878. *Megapodius*. Studer, T. 1877, 1878. *Struthio*. Hildebrandt, G. F. 1805.

Homology with scutes. Davies, H. R. 1889. Book. Text in German. Maurer, F. 1895; Meckel, A. 1915; Meijere, J. C. 1895. *Gallus* & *Turdus*. Schleidt, J. 1913.

Rudimentary neossoptyles in mouth cavity of embryo—tongue papillae. *Anas*. Fraisse, P. 1881b.

TELEOPTYLES (ADULT OR DEFINITIVE FEATHERS)

Blue-colored feathers. Structure. Haecker, V. & Meyer, G. 1901.

Bristle feathers of crown. *Balearica*. Hesse, E. 1907a.

Fossil feathers. Bayan, F. 1873; Meyer, A. B. 1887b.

Good figures in early publications. Blanchard, C. E. 1851–60.

"Hairy" feathers. *Gallinula*. Gurney, J. H. Jr. 1884b.

Nuptial feathers. *Botaurus lentiginosus*. *Brewster, W. 1911a; Strong, R. M. 1911a.

Secondary coverts. *Aix galericulata* & *Aix sponsa*. Miller, W. D. 1925.

Tactile feathers. Development and innervation. Küster, E. 1905.

Uropygeal gland feathers. Many species. Book. Text in German. Nitzsch, C. L. & Burmeister, C. C. 1840. Figures for many species. Paris, P. 1910.

Velvet and silky feathers. Many species. Rensch, B. 1923c.

Down feathers

General. Anatidae. Harvie-Brown, J. A. 1906; Workman, W. H. 1907a.

Abnormal down feathers due to malnutrition. *Gallus* & *Streptopelia*. Riddle, O. 1908a.

"Specialization" of tail down feathers. Anatidae. Beebe, C. W. & Crandall, L. S. 1914.

Structure. *Anas*. *Ewart, J. C. 1921.

Weights. Magnan, A. 1912g.

Filoplumes

General. Strigidae. Pycraft, W. P. 1898a.

Filoplumes projecting beyond ends of contour feathers. *Emberiza polioptera*. Witherby, H. F. 1906.

Flight feathers

Book. Text in German. Precht, J. J. 1846.

General. Amans, P. C. 1885.

RECTRICES

General. Many species. Marshall, W. A. 1872a. Columbæ. Garrod, A. H. 1874d. *Phasianus*. Seligmann, C. G. 1906. *Podiceps*. Pycraft, W. P. 1909c.

Separate control claimed for outer two rectrices. *Gyps*. Jourdain, F. C. 1907b.

Structure. *Tachybaptus*. Pycraft, W. P. 1907h.

Submedial pair. Barbs united at distal ends to form filament which becomes detached as growth advances. *Vidua paradisica*. Strickland, H. E. 1850.

Unusual length. Race of fowls bred in Japan. *Gallus*. Chamberlain, B. H. 1899; *Cunningham, J. T. 1901; Dean, B. 1907; Finn, F. 1901a; Gloger, C. W. 1860b.

Weights. Many species. Magnan, A. 1912f.

Number of rectrices

General. *Ardetta cinnamomea*. Kellsall, H. J. 1900.

Taxonomic significance. Cabanis, J. L. 1847.

REMIGES

General. Alix, H. E. 1874f; *Pycraft, W. P. 1899d, 1902a; *Steiner, H. 1916; Vian, J. 1871-72. *Archaeopteryx*. Hurst, C. H. 1893; Pycraft, W. P. 1894. Gruiformes. Mitchell, P. C. 1901a. *Meleagris*. Amans, P. C. 1913b.

Ligaments. Pelissier, M. 1923.

Phylogeny of remiges. Gadow, H. F. 1888.

Weights. Magnan, A. 1912e.

Number of remiges

General. Gadow, H. F. 1888.

Taxonomic significance. Cabanis, J. L. 1847.

Primaries

Abbreviated inner primaries. Piciidae. Chapin, J. P. 1921.

Bastard primary. Alaudidae. Witherby, H. F. 1916a.

Emargination. Interlocking. Function in soaring flight. Coues, E. B. 1888a; Trowbridge, W. P. 1887-91,

1891-92. *Buteo*, *Circus*, & *Pandion*. Trowbridge, C. C. 1904, 1906.

Enormously elongated primary feathers. *Cosmetornis vexillarius* & *Macrodipteryx macrodipterus*. Pycraft, W. P. 1904c.

First primary. Passeriformes. Butler, A. Gardiner & Butler, A. George 1898; Hartert, E. J. 1899b.

Number of primaries. Jeffries, J. A. 1881b. Passeres. Coues, E. B. 1876b.

Relation of outer primary to migration. Averill, C. K. 1925.

Separate control of the two outermost primaries claimed. *Gyps*. Jourdain, F. C. 1907b.

Secondary remiges (Cubitals)

General. *Aix galericulata* & *Aix sponsa*. Miller, W. D. 1925.

Fifth cubital remex. Presence or absence. Neognathæ. Slater, P. L. 1890b.

Powder-down

Peculiar, highly modified, oily feathers occurring in concealed patches, in some groups of birds.

Book. Text in German. Nitzsch, C. L. & Burmeister, C. C. 1840.

General. *Ardea*. Dewar, J. M. 1909a; Pycraft, W. P. 1908e; Rimrod, F. A. 1855. Ardeidae. Schaub, S. 1908. *Botaurus s. stellaris*. *Stieda, C. H. 1870b. *Chunga*. Schaub, S. 1914. *Circus*. Chandler, A. C. 1914b. Cochleariidae. Murie, J. 1872b. Columbæ. Pycraft, W. P. 1908d. Eurypygidae. Murie, J. 1872b. *Gallus*. Stieda, C. H. 1869b. *Leptosoma discolor*. Slater, P. L. 1865c. *Mesites*. Bartlett, E. 1877; Forbes, W. A. 1882e; Schaub, S. 1914. *Nycticorax n. naevius* [hoacili]. Gross, A. O. 1923a. *Podargus*. Slater, P. L. 1866a. *Psophia*. Schaub, S. 1914. Rhinocetidae. Murie, J. 1872b. *Rhinocetus jubatus*. Schaub, S. 1914.

Development. Many species. *Schüz, E. 1927.

Function. Supplies grease for dressing feathers when uropygeal gland is absent. Ardeidae. Wetmore, A. 1920c.

Nomenclature. *Rhinocetus jubatus*. Murie, J. 1871.

Structure and function. Many species. *Schüz, E. 1927.

VARIOUS FEATHER STRUCTURES

Appendages due to continuity at second autumnal molt. *Columba*. Jackson, A. C. 1913a.

Terminal shaft dilation structure and pigmentation. *Ampelis*. *Anderson, C. H. 1859.

Aftershaft (Hyporhachis)

General. Dallas, W. S. 1865. Many species. Beddard, F. E. 1885b; *Rochebrune, A. T. 1884. *Chaetura*, *Cypselus*, *Numida*, & *Perdix*. Beddard, F. E. 1885b.

Development, degeneration, and function. Clark, H. L. 1893a.

Structure. Miller, W. D. 1924b.

Platelet appendages

Due to fusion of feather elements in development.

General. *Ampelis* [*Bombycilla*]. Hatch, P. L. 1893. *Ampelis* [*Bombycilla*] *g. garrulus*. Schlegel, R. 1893; Stieda, C. H. 1872; Anon. 1835a. *Gallus sonneratii*. Marshall, W. A. 1874. *Rallus*. Bonhote, J. L. 1911c, d.

Wax-like tips to secondaries. Development in juvenal plumage. *Bombycilla*. Phillips, G. G. 1913.

Shape changes

Due to loss of feather elements.

Loss of distal portions of breast feathers reducing feathers to short stiff structures. *Centrocercus urophasianus*. Horsfall, R. B. 1920.

Racket feathers formation. Barbs drop off naturally from large portion of elongated central rectrices. *Momotidae*. Amédée-Pichot, P. 1917. *Momotus*. Astley, H. D. 1916; Beebe, C. W. 1910a; Delacour, J. T. 1917a; Pichot, P. A. 1917; Salvin, O. 1873. *Prioniturus*. Wigglesworth, L. W. 1900.

FECUNDITY

For fecundity in poultry see under Poultry culture: Egg production.

Books. Text in English. *Tympanuchus cupido americanus*. Gross, A. O. 1930.

Text in French. References to medieval and classical literature. *Gallus*. Buffon, G. L. 1770-86.

General. Fox, W. S. 1899b; Heier, E. 1909; Mousley, W. H. 1917c; Rey, J. G. 1872a; Rivière, B. B. 1897, 1899. Includes birds. Bellingeri, C. F. 1841.

Anas boschas. Austin, E. H. 1908. *Anthus pratensis*. Thomasson, J. P. 1893. *Cuculus*. Rey, J. G. 1894a; Stimming, R. 1927. *Cygnus atratus*. Schmidt, M. 1882. *Fringilla*. Butterfield, E. P. 1908a; Gygell, W. 1908. *Gallus*. Card, L. E. 1917; *Goodale, H. D. 1916a, 1918c, 1919f; Hall, G. O. & Marble, D. R. 1931; Jull, M. A., Quinn, J. P., & Godfrey, A. B. 1933; Pearl, R. 1910b; Rice, J. E. 1915. *Oxyechus v. vociferus*. Pickwell, G. B. 1925a. *Passer*. Christy, M. 1914a; Reese, A. M. 1907. *Pinicola*. Knight, O. W. 1896. *Podiceps*. Bentham, C. H. 1908. *Serinus*. Greiff, J. 1886. *Struthio*. Duerden, J. E. 1907b. *Zenaidura*. Nice, M. M. 1922, 1931b. Hybrids. Ghigi, A. 1923a. *Columba livia* × *C. leuconota*. Ghigi, A. 1920b. *Dafila acuta* × *Anas boschas*. Lecaillon, A. 1922a.

Biometric study. *Gallus*. Dunn, L. C. 1924g. Pearl, R. & Surface, F. M. 1908c, 1909b, 1914a.

Breeding for fecundity. *Gallus*. *Pearl, R. 1912a, 1914a.

Comparison of wild species with domestic fowl. Tollenaar, D. 1922a.

Cross between two highly productive races of poultry. Goodale, H. D. 1925b.

Egg-weight as a criterion of numerical egg production. *Gallus*. Hadley, P. B. 1919a.

Measurement of changes in fecundity rate. *Gallus*. Pearl, R. 1914c.

Methods for increasing fecundity in winter. *Gallus*. Goodale, H. D. 1924b.

Number of eggs in set. Many species. Hamonville, J. C. 1894; Moquin-Tandon, C. H. 1859.

Variations in fecundity. Davies, B. 1898, 1899a, b; Fox, W. S. 1899b. *Gallus*. Pearl, R. & Surface, F. M. 1911.

CORRELATIONS

General. *Gallus*. Harris, J. A. & Blakeslee, A. F. 1918; Harris, J. A.,

Blakeslee, A. F., Warner, D. E., & Kirkpatrick, W. F. 1917; Harris, J. A. & Lewis, H. R. 1921, 1922a, b, c.

Brooding tendency. *Gallus*. Hays, F. A. & Sanborn, R. 1926b.

Hatching power of hen. *Gallus*. Hyre, H. M. & Hall, G. O. 1932.

Period of year. *Gallus*. Harris, J. A. & Goodale, H. D. 1922; Harris, J. A. & Lewis, H. R. 1922a, b, c, d, 1923a, b.

Pigmentation of body. *Gallus*. Harris, J. A., Blakeslee, A. F., Warner, D. E., & Kirkpatrick, W. F. 1917.

Rate of laying. *Gallus*. Hays, F. A. & Sanborn, R. 1927a.

Sex ratio. Callenbach, E. W. 1929. *Gallus*. Jull, M. A. 1931b.

Skull measurements. No correlation. *Gallus*. Marble, D. R. 1932.

Type of activity. Hann, O. 1879.

Yellow carotinoid pigments. *Gallus*. Blakeslee, A. F. & Warner, D. E. 1915; Palmer, L. S. & Kempster, H. L. 1919b, c.

EXCEPTIONAL FECUNDITY

Hen laying 1,000 eggs. *Gallus*. Dackweiler, W. 1909.

Laying two eggs in a day. *Gallus*. Drew, G. A. 1907. Two normal eggs laid in ten minutes. *Gallus*. Crichton, A. 1873.

Ten eggs in nest. *Sterna h. hirundo*. Massey, H. 1915.

Eggs removed soon after laying in most (presumably in all) cases

General. *Anas*. Erdmann, —. 1886.

Eighteen eggs laid. *Scolopax*. Banks, A. 1897. *Totanus*. Alderson, H. 1897.

Sixty-two eggs laid. *Iynx*. Alderson, H. 1897.

Thirty-nine eggs laid in 39 days. *Colaptes*. Bales, B. R. 1917.

Thirty-two eggs laid. *Cinclus*. Alderson, H. 1897.

Twenty-eight eggs laid. *Cinclus*. Grabham, O. 1897a.

Twenty-one eggs recorded for one female. *Cuculus*. Chance, E. P. 1919, 1921.

Birds in captivity

146 eggs laid in 158 days. *Anas boschas*. Mouquet, A. 1924.

491 eggs laid in seven years. *Porphyrio*. Brazier, J. 1886.

FACTORS IN FECUNDITY

General. *Gallus*. *Goodale, H. D. 1918c.

Anatomical basis. *Gallus*. Pearl, R. & Schoppe, W. F. 1921.

Correlation of factors. *Gallus*. Hays, F. A. & Sanborn, R. 1927b.

Disease. *Gallus*. Goodale, H. D. 1919b.

Food supply. Harvie-Brown, J. A. & Bunyard, P. F. 1910.

Inbreeding experiments. Goodale, H. D. 1924a.

Light. Hesse, R. 1923. Effect of daylight on size of clutch. Haviland, M. D. 1923.

Male not a factor, but food and good conditions are. *Gallus*. Lafon, J. 1891.

Period following copulation. Gowell, G. M. 1902, 1906.

Selection. *Gallus*. Goodale, H. D. 1919d.

Weight at sexual maturity. *Gallus*. Hays, F. A. 1933b.

Age factors

General. *Gallus*. Pearl, R. 1913d.

Decline in old age. *Gallus*. Brody, S., Henderson, E. W., & Kempster, H. L. 1923.

AGE OF

Parents. *Gallus*. Hays, F. A. 1928. *Gallus* incidental. Pearl, R. 1913d.

Sexual maturity. *Gallus*. Kempster, H. L. 1921.

Experimental feeding

General. *Anas*. Magnan, A. 1912b, m. Milk in diet. Clément, E. C. 1874-75.

Pituitary extract. *Gallus*. Simpson, S. 1923.

INHERITANCE OF FECUNDITY

General. *Gallus*. Foreman, E. C. 1922; Hurst, C. C. 1923.

Winter egg production. *Gallus*. Goodale, H. D. 1918b, d; Goodale, H. D. & Macmullen, G. 1919.

FOOD

See also under Economic ornithology and Habits: Feeding habits.

Books. Text in English. Beebe, C. W. 1906a; Catesby, M. 1731-43; Collinge, W. E. 1913b, 1924-27; Cran-
z, D. 1767; Pycraft, W. P. 1910a; Sil-
loway, P. M. 1897. Australia. Mathews,
G. M. 1910-28. British Isles. Morris,
F. O. 1870. New Zealand. Oliver,
W. R. 1930; Thomson, G. M. 1922.
United States. Pearson, T. G. 1917.
Florida. Howell, A. H. 1932. Maine.
Knight, O. W. 1908. New England.
Forbush, E. H. 1907. *Aquila chry-*
saitos. Gordon, S. P. 1927. *Colinus v.*
virginianus. Stoddard, H. L. 1925b,
1931. Falconiformes. Swann, H. K.
1924. *Lagopus scoticus*. Lovat, —
and others 1911. *Larus*. Semper,
K. G. 1881. *Sturnus vulgaris*. Bready,
M. B. 1929. *Syrphantes paradoxus*.
Tegetmeier, W. B. 1888. *Tympanuchus*
cupido americanus. Gross, A. O. 1930.

Text in French. Corvidae. Madon,
P. 1928. Rapacious birds. Madon, P.
1933.

Text in German. Floericke, C. E.
1908-13. Pici. Marshall, W. A. 1889.

General. Aplin, O. V. 1906, 1910;
Baker, F. C. 1889b; Baldamus, A. C.
1880; Bauer, C. 1877; Beal, F. E. &
McAtee, W. L. 1912; Bräss, M. 1887;
Brewer, T. M. 1866; Butler, A. G. 1912;
Chaignon, —. 1912; Chernel von
Chernelhaza, I. 1901a; Collinge, W. E.
1918c; *Csiki, E. 1904; Csörgey, T.
1926b; Delevoy, G. 1909; Finn, F.
1896; Gabrielson, I. N. 1922; Gröbbels,
F. 1928; Groom, C. O. 1865; Krohn, H.
1903; McAtee, W. L. 1905a, 1913b,
1915f; Macpherson, H. A. 1895b;
Millet-Horsin, —. 1920; Morris, F. O.
1866; Neu, J. 1880a; Norgate, F. 1881;
Plačzek, B. 1901; Poulton, E. B. 1908;
Roberts, G. 1863; Saxby, H. L. 1861;
Schuster, W. 1906a; Škovgaard, P.
1920c; Snell, F. H. 1857d; Stubbs, F. J.
1914; Woodruffe-Peacock, E. A. 1919;
Anon. 1914d. Many species. Boucard,
A. 1901. Include birds. Balland, J. A.
1900; Osgood, W. H. 1909; Rörig, G.
1911. Includes Arctic birds. Stappers,
L. 1910.

AFRICA

Books. Text in English. Shelley,
G. E. & Sclater, W. L. 1896-1912.

Madagascar. Text in French. Schlegel,
H. & Pollen, F. P. 1868.

AMERICA

North America

General. *Bent, A. C. 1919, 1921,
1922, 1923, 1925, 1926, 1927, 1929,
1932, 1937. Game birds. Henshaw,
H. W. 1915.

Alaska. Pribilof Islands. McAtee,
W. L. & Preble, E. A. 1923.

Eastern North America. Book. Text
in English. Chapman, F. M. 1912b.

CANADA

General. Kingston, A. G. 1892a;
Witchell, C. A. 1896c.

Western Canada. Taverner, P. A.
1926.

Vancouver Island. Alford, C. E.
1928.

UNITED STATES

General. Cockerell, T. D. 1901;
Marshall, W. 1887.

New England. Book. Text in
English. Forbush, E. H. 1907.

Southeastern United States. Beal,
F. E., McAtee, W. L., & Kalmbach,
E. R. 1916.

Southern United States. Brimley,
C. S. 1887b.

California. Beal, F. E. 1910; Davis,
W. B. 1933; Tyler, J. G. 1913.

Colorado. Cockerell, T. D. 1896.

Florida. Book. Text in English.
Howell, A. H. 1932.

Illinois. Forbes, S. A. 1880a, b, c, d,
1883, 1884, 1908.

Indiana. Butler, A. W. 1891.

Maine. Book. Text in English.
Knight, O. W. 1908.

Michigan. Gaige, F. M. 1914.

Nebraska. Aughey, S. 1878.

New Mexico. Cockerell, T. D. 1901.

New York. Oneida Lake region.
Stoner, D. 1932.

North Carolina. Brimley, C. S. 1888b.

Ohio. Wheaton, J. M. 1874.

Oklahoma. Nice, M. M. 1931a; Tate, R. C. 1925.

Pennsylvania. General. Warren, B. H. 1886a. Book. Text in English. Warren, B. H. 1888.

Texas. Oberholser, H. C. 1925.

Utah. Food in Salt Lake. Water birds. Wetmore, A. 1917d.

Virginia. Clayton, J. 1694.

West Virginia. Brooks, E. A. 1908, 1916a.

WEST INDIES

Puerto Rico. Beatty, H. A. 1930.

Trinidad Island. Williams, C. B. 1922a.

Trinidad and Tobago islands. Feilden, G. S. 1914.

Middle America

Panama region. Hallinan, T. 1924.

South America

Chile. Johow, F. 1898.

Ecuador. Chapman, F. M. 1926.

North Atlantic Ocean

General. Wynne-Edwards, V. C. 1935b.

ASIA

India. Mason, C. W. 1912.

West India. Bowdish, B. S. 1903.

Siberia. Grote, H. 1926.

EUROPE

General. Beal, F. E. 1897a.

Austria

General. Talský, J. 1896.

British Isles

General. Collinge, W. E. 1915b, 1918e, 1919a; Elmhirst, R. 1910; Hooper, C. H. 1907; Newman, E. 1863; Newstead, R. 1908. Game birds. Collinge, W. E. 1917c.

Recent changes. Wilson, W. 1911.

Scotland. Florence, L. 1912, 1914, 1915; Ritchie, J. 1918.

Denmark

General. Skovgaard, P. 1920c.

Faroe Islands. Arenberg, E. & Anthony, R. L. 1913.

Finland

General. Includes birds. Palmgren, P. 1928.

France

General. Carié, P. 1916; Chaignon, —. 1912; Cocu, G. 1899; Delevoy, G. 1909; Lescuyer, J. F. 1887; Madon, P. 1926a; Prévost, F. 1858; Quinet, A. 1901b; Anon. 1914b.

Germany

General. Baer, W. 1897b, 1903b, 1909; Baer, W. & Uttendörfer, O. 1897a; Bandekow, L. 1903; Braun, F. 1900a, 1918a; Bukowsky, J. W. 1906; *Eckstein, K. 1887; Gröbbels, F. 1928; Haller, G. 1873a, b; Hesse, E. 1921; Leisewitz, W. 1906, 1907; Loos, C. 1892, 1894, 1897, 1902c; Parrot, C. P. & Leisewitz, W. 1905; Plačzek, F. 1901; Rörig, G. 1905b; Walter, J. 1892; Winkelman, J. 1878.

Hungary

General. Herman, O. 1903b, 1904, 1907b.

Italy

General. Moltoni, E. & Sciacchitano, I. 1926; Passerini, N. & Cecconi, G. 1907.

Norway

Spitzbergen. Summerhayes, V. S. & Elton, C. S. 1928.

Russia

General. Grote, H. 1926.

OCEANICA

Marcus Island. Bryan, W. A. 1903.

Australia

General. Berney, F. L. 1907; McAtee, W. L. 1917d.

New South Wales. Hyem, E. L. 1936; McKeown, K. C. 1934.

North Queensland. Robinson, H. C. & Laverock, W. S. 1900.

East Indies

Java. Koningsberger, J. C. 1909.

New Guinea. Greenway, J. C. 1935.

Hawaii

Introduced birds. Bryan, W. A. 1912.

EXPERIMENTAL FEEDING

General. *Archilochus*. Sherman, A. R. 1913a. *Gallus*. Schimanski, H. 1879.

Calcium administration. Laying hens. Buckner, G. D. & Martin, J. H. 1920.

Glycine administration in diet deficient in Vitamin B. *Columba*. Kon, S. K. 1927a.

Intestinal effects. Magnan, A. 1910a, 1911b, 1912a.

Iron and copper in relation to hemoglobin formation. *Gallus*. Hart, E. B. and others 1929-30.

Results of feeding eggs of *Porthetria dispar* to birds. Collins, C. W. 1910.

Vegetable material to carnivorous birds. Carradori, — & Spallanzani, L. 1798.

Carnivorous diet for granivorous birds

General. *Columba*. Holmgren, F. 1867. *Gallus*. Houssay, F. 1901a, 1902a, c, d, 1903a, 1907.

Meat diet causing atrophy of gonads. *Gallus*. Pézard, A. 1919a.

STOMACH EFFECTS

General. *Anas*. Magnan, A. 1911c, 1912p.

No effect on lining of stomach. *Gallus*. *Brandes, G. 1896b.

Relative size of gizzard and proventriculus. Magnan, A. 1911k.

FOOD OF VARIOUS BIRDS

British birds. Recent changes. Wilson, W. 1911. British game birds. Collinge, W. E. 1917c.

Captive birds. See also under **Aviculture**. Many species. Gunther, A. C. 1910. Young birds. Rey, J. G. 1872a. *Nycticorax*. Bailey, B. H. 1912a. *Sitta*. Daley, F. K. 1926. *Sphyrapicus*. Bolles, F. 1892b. *Strix*. Bolles, F. 1890, 1912.

Farm birds. Forbush, E. H. 1903; Henshaw, H. W. 1913.

Nestling birds. Cahn, A. R. 1914; Collinge, W. E. 1912c; Enders, H. E. & Scott, W. 1915; Judd, S. D. 1900; Jones, L. 1913. *Carduelis*. Wood, J. C. 1913. *Passer*. Collinge, W. E. 1914b. *Progne s. subis*. Doolittle, E. A. 1919. *Turdus migratorius*. Slade, E. 1882; Treadwell, D. 1859.

Predaceous birds. Hennicke, C. R. 1903; Lataste, F. 1892. California. Bryant, H. C. 1918. Denmark. Ferdinand, J. 1923. Europe. Book. Text in French. Madon, P. 1933.

Sea birds. Book. Text in English. Cranz, D. 1767.

Small birds. Bennett, E. T. 1863; Harting, J. E. 1863.

Waterfowl. Nebraska. Oberholser, H. C. & McAtee, W. L. 1920.

Acanthis. Loos, C. 1894. *Accipiter nisus*. Lambrecht, K. 1914b; Meade-Waldo, E. G. 1914; Owen, J. H. 1915; Schnurre, O. 1932. *Acredula*. Loos, C. 1894. *Agelaius*. Allen, A. A. 1914b; Gabrielson, I. N. 1914b, 1915c. *Alauda arvensis*. Smith, J. A. 1867b. *Alcedo*. Waterton, C. 1835d. *Alcedo altis ispida*. Liebe, K. T. 1883. *Anas*. La Fresnaye, F. 1842; Norton, A. H. 1909. *Anas mollissima* & *Anas nigra*. Allis, T. 1832a. *Anatidae*. Adams, L. E. 1905-06; Corbin, G. B. 1889; Mabbott, D. C. 1920; McAtee, W. L. 1911i, 1914b, 1915e; Merlet, N. 1886; Norton, A. H. 1909; Wetmore, A. 1921c. *Anous s. stolidus*. Watson, J. B. 1908. *Anser*. La Fresnaye, F. 1842. *Anserinae*. Norton, A. H. 1909. *Aphriza*. Dixon, J. S. 1927. *Aptenodytes*. Slater, P. L. 1888. *Aquila*. Rothermundt, J. 1905; Sumner, E. L. 1929. *Aquila gliuchii*. Sushkin, P. P. 1896a. *Ardea*. Mattingley, A. H. 1908b; Waterton, C. 1835c. *Ardea purpurea*. Vasvari, N. 1931. *Ardeidae*. Bartsch, P. 1903. *Ardeinae*. Baynard, O. E. 1912. *Ardetta minuta*. Lucanus, F. K. 1914. *Arenaria* & *Arquatella*. Norton, A. H. 1909. *Asio f. flammeus*. Urner, C. A. 1925. *Asio o. otus*. Geyr von Schwep-

- penburg, H. 1907a; Lambrecht, K. 1914b. *Asio wilsonianus*. Murray, J. J. 1930; Stoddard, H. L. 1922b; Warthin, A. S. & Van Tyne, J. 1922. *Astur*. Grossmann, H. 1909; Sutton, G. M. 1927b. *Athene noctua*. Atchinson, G. T. 1912; Collinge, W. E. 1922b, c; Lancum, F. H. 1925; Loyd, L. R. 1912. *Bombycilla cedrorum*. Post, K. C. 1916; Saunders, A. A. 1911. *Bonasa*. Bennetts, W. J. 1900b; Gross, A. O. 1925a; Johnson, R. A. 1928; Knappen, P. M. 1928a. *Bubo virginianus*. Gardner, L. L. 1929; Pittman, H. H. 1925. *Buteo*. Barthos, G. 1908; Stresemann, E. 1925d. *Buteo p. platypterus*. Burns, F. L. 1911. *Buteo swainsoni*. Criddle, N. 1915. *Buteo vulgaris*. La Fuye, M. & Dumast, G. 1911. *Calornis*. Banfield, E. J. 1912. *Caprimulgus*. Collinge, W. E. 1920a. *Caprimulgus europaeus*. Heinroth, O. A. 1909a. *Carpodacus*. Bergtold, W. H. 1914. *Casuaris*. Rothschild, L. W. 1901. *Ceophloeus*. Bryant, H. C. 1916b. *Ceryle* [*Megaceryle*] *alcyon*. Coues, E. B. 1878a. *Charadrius* [*Pluvialis*] *d. dominicus*. Mackay, G. H. 1891a. *Charadrius h. hiaticula*. Percival, W. G. 1902b. *Ciconia alba*. Skovgaard, P. 1920d. *Ciconia nigra*. Skovgaard, P. 1932d. *Cinclus*. Ehinger, C. E. 1930; Rzehak, E. C. 1895b. *Cinclus aquaticus*. Saxby, H. L. 1863b. *Circus*. Chiquet, —. 1924. *Circus hudsonius*. Urner, C. A. 1925. *Clangula hyemalis*. Mackay, G. H. 1892d. *Coccothraustes vespertina*. Shufeldt, R. W. 1890c. *Coccyzus*. Herrick, F. H. 1910b. *Colinus v. virginianus*. Nice, M. M. 1910; McAtee, W. L. 1910c. *Columba*. Snell, F. H. 1857c. *Columba palumbus*. Pethybridge, G. H. 1911; Pfannenschmid, E. 1892; Tegetmeier, W. B. 1871; Waterton, C. 1834a. *Columbidae*. Butler, A. G. 1903a; Whitman, C. O. 1919a. *Colymbidae*. Wetmore, A. 1924. *Coracias*. Philipps, R. 1898. *Corvidae*. Collinge, W. E. 1930; Pearson, T. G. 1933a; *Rörig, G. 1898b, c, 1900d. *Corvus*. Barrows, W. B. 1888; Dodsworth, P. T. 1911; Loos, C. 1896b; Schleh, E. 1904; Townsend, C. W. 1918. *Corvus c. corax*. Neale, J. J. 1901. *Corvus corone*. Aplin, O. V. 1883; Haller, G. 1873a; Meise, W. 1928; Waterton, C. 1833a. *Corvus f. frugilegus*. Beal, F. E. 1896b; Csörgey, T. 1904, 1926b; Gelei, J. 1926; Hauer, B. 1904; Long, S. H. and others 1918; Smail, J. 1884; Waterton, C. 1834b. *Corvus m. monedula*. Waterton, C. 1833a. *Crex crex*. Collinge, W. E. 1931. *Cryptoglaux a. acadica*. Miller, R. F. 1923; Terrill, L. M. 1931. *Crypturus tataupa*. Seth-Smith, D. 1903. *Cuculidae*. Beal, F. E. 1898b. *Cuculinae*. Abadie, R. 1927. *Cuculus*. Blyth, E. 1835a; Link, J. A. 1889; Schiermann, G. 1926. *Cyanocitta*. Beal, F. E. 1896a. *Cygninae*. Beebe, C. W. 1906e. *Cygnus*. Blundell, J. M. 1905–06. *Cypselidae*. Shufeldt, R. W. 1893a. *Dendroica kirtlandi*. Leopold, N. F. 1924. *Dichoceros bicornis*. Bingham, C. T. 1897. *Diomedidae*. Sanford, W. A. 1880. *Dromiceius*. Tegetmeier, W. B. 1868b. *Dryobates*. Owen, J. H. 1925; Snyder, W. E. 1897. *Dumetella carolinensis*. Gabrielson, I. N. 1913b. *Ectopistes*. Bishop, S. C. 1924; Dury, C. 1910b. *Elanus*. Barlow, C. 1897. *Falco*. Ghigi, A. 1912f. *Falco mexicanus*. Tyler, J. G. 1923. *Falco peregrinus*. Cordeaux, J. 1876; Nagy, E. 1907a; Peters, J. F. 1920; Winkler, H. 1908. *Falco sacer*. Johansen, H. 1904b. *Falco sparverius*. Sherman, A. R. 1913b. *Falco subbuteo*. Poncy, R. 1925. *Falcones*. Bittera, J. 1916; Dury, C. 1885; Fisher, A. K. 1888b; Olivier, G. 1926. *Falconiformes*. Le Souëf, W. H. 1918; Errington, P. L. 1933; Uttendörfer, O. 1934. *Fulmarus*. Anthony, A. W. 1895b; Patursson, S. 1927. *Galeoscoptes* [*Dumetella*] *carolinensis*. Judd, S. D. 1897. *Garrulus*. Burg, G. 1902; Gurney, J. H. 1892; La Fuye, M. 1911; Loos, C. 1896b; Müller, K. 1890; Philipps, R. 1898. *Gavia*. Ganong, W. F. 1896. *Gecinus viridis*. Krüdener, A. 1889. *Gelochelidon*. Blanchet, A. 1925. *Geococcyx californianus*. Bryant, H. C. 1915b, 1916a. *Geothlypis*. Shaver, N. E. 1918. *Gerontiacus eremita*. Pallary, P. 1922. *Glaucidium*. Ihering, H. 1899. *Gypaetus barbatus*. Kammer, A. 1922–24. *Gyps kolbii*. Taylor, C. H. 1908. *Haliaeetus leucocephalus*. Brooks, A. 1922; Crabb, E. D. 1922; Herrick, F. H. 1924a. *Himantopus*. Wetmore, A. 1925a. *Hirundinidae*. Beal, F. E. 1918. *Hirundo erythrogaster*. Adams, S. J. 1898. *Histrionicus*. Michael, C. W. & Michael, E. 1922; Whitfield, R. P. 1894. *Hypoleucus*. Morgan, A. M. 1917b; White, S. A. 1916, 1918. *Icteridae*. Beal, F. E. 1900a. *Ionornis martinicus*. Gross, A. O. & Van Tyne, J. 1929. *Lagopus*. Grimshaw, P. H. 1925; Kolderup, C. F. 1924; Morand, P. 1913. *Lagopus scoticus*. Stubbs,

- F. J. 1909c. *Laniidae*. Judd, S. D. 1898. *Lanius b. borealis*. Cahoon, J. C. 1888; Smith, H. G. 1888. *Lanius collurio*. Csiki, E. 1911; Rzehak, E. C. 1895a, 1905b. *Lanius erythronotus*. Magrath, H. A. 1910. *Lanius ludovicianus*. Mounts, B. T. 1923, 1925; Stephens, K. 1906. *Larus*. Blake-Knox, H. 1867b; Eifrig, C. W. 1905; Norton, A. H. 1909. *Larus argentatus*. Blake-Knox, H. 1866-67; Burrill, A. C. 1919; Dutcher, W. & Baily, W. L. 1903; Robinson, H. W. 1910. *Larus r. ridibundus*. Laidlaw, T. G. 1908; Macpherson, H. A. 1899a; Pycraft, W. P. 1907j. *Lathamus*. Cole, C. F. 1919. *Lobipes*. Wetmore, A. 1925a. *Lophortyx c. californica*. Sumner, E. L. 1935. *Loxia*. Bütikofer, E. 1909; Kane, W. F. 1916; Moffat, C. B. 1916. *Lyrurus*. Hagstroem, O. & Anderson, A. S. 1772.
- Macrorhamphus*. Norton, A. H. 1909. *Mareca penelope*. Waterton, C. 1835g. *Marila*. Norton, A. H. 1909. *Megalaema*. Dodsworth, P. T. 1912a. *Meleagris*. Barton, B. S. 1805. *Meliphagidae*. Darnell-Smith, G. P. 1910. *Mergus serrator*. Robinson, H. W. 1909b; Strong, R. M. 1912e; Szielasko, A. E. 1895. *Merula bouboul*. Butler, A. G. 1906b. *Microcarbo*. Morgan, A. M. 1917b; White, S. A. 1916, 1918. *Micropus apus*. Bacmeister, W. 1922. *Mimus*. Whittle, C. L. 1922a. *Molothrus*. McAtee, W. L. 1911h. *Muscicapa*. Blackwall, J. 1829. *Muscicapidae*. Collinge, W. E. 1928. *Mycteria americana*. Bryant, H. C. 1919. *Myiarchus*. Gabrielson, I. N. 1915b. *Nothura maculosa*. Serié, P. 1921. *Nucifraga*. Donner, E. 1908; Fenton, L. L. 1906. *Nyctea nyctea*. Sutton, G. M. 1927b. *Nycticorax n. naevius [hoaculi]*. Gross, A. O. 1923a; Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Oreortyx picta palmeri*. Belding, L. 1892. *Otis*. Lafourcade, P. 1890. *Otocoris*. Barrows, W. B. 1893; Cridle, N. 1920. *Otus*. Clabaugh, E. D. 1926. *Parabuteo unicinctus harrisi*. Miller, L. H. 1925b. *Parus*. Cotte, J. 1913. *Passer*. Balandier, A. 1910; Ghigi, A. 1905b; Pion, A. 1902; Rusinova, K. I. 1926. *Passeriformes*. Trillon, J. 1887. *Pelecanoididae*. Murphy, R. C. & Harper, F. 1921. *Pelecanus occidentalis*. Bailey, A. M. 1918. *Perdicinae*. Kuroda, Y. 1928. *Perdix*. Kelso, L. 1932. *Perdix perdix*. Lósy, J. 1903. *Perisoreus*. Bennetts, W. J. 1900a; Skinner, M. P. 1921. *Pernis apivorus*. Dumast, G. 1912; Mani-quet, L. 1926; Smith, J. A. 1858d. *Phaethon*. Gross, A. O. 1912. *Phalacrocorax dilophus [a. auritus]*. Mackay, G. H. 1894b. *Phalaropodidae*. Wetmore, A. 1925a. *Phaps elegans*. Seth-Smith, D. 1904b. *Phasianus*. Grimshaw, P. H. 1912; Pethybridge, G. H. 1911; Waterton, C. 1833b. *Pica*. Aplin, O. V. 1883; Best, D. 1899; Dalla Torre, K. W. 1887; Loos, C. 1896b. *Picidae*. Beal, F. E. 1895b, 1911; Brimley, C. S. 1888c; Cook, A. J. 1896; Crabb, E. D. 1930; Cram, W. E. 1898; Smith, J. B. 1894; Trouvelot, B. 1925. *Picus*. Bertram, K. 1903; Loos, C. 1900a. *Picus epichithonius*. Snell, D. H. 1866. *Picus martius*. Rendle, M. 1912. *Picus viridis*. Buxbaum, L. 1898. *Platycercus*. Cole, C. F. 1919. *Podiceps*. Grabham, O. 1899; Madon, P. 1926b. *Procellariiformes*. Hombron, J. B. & Jacquinot, C. H. 1844; Meyer, A. B. 1886b. *Progne*. Jacobs, J. W. 1903, 1909; Miller, C. W. 1909. *Psittacus indicus*. Hauth, —. 1900-01. *Puffinus anglorum*. Macpherson, H. A. 1889b. *Puffinus p. puffinus*. Warren, R. 1889a; Anon. 1888a. *Pyrenestes*. Chapin, J. P. 1924b. *Pyrrhula*. Collinge, W. E. 1912b. *Quiscalus*. Beal, F. E. 1894; Garman, H. 1907. *Rallus aquaticus*. Allis, T. 1832b. *Ramphastos*. Stevens, R. P. 1870. *Ramphastos brevicarinatus*. Van Tyne, J. 1929. *Rostrhamus*. Lang, H. 1924. *Sayornis*. Lincoln, F. C. 1926b. *Schizura*. Detwiler, J. D. 1922. *Scolopax rusticola*. La Rochefoucauld, P. 1911b. *Sialia*. Forbes, S. A. 1880b. *Somateria*. Embody, G. C. 1910; Evans, W. 1909; Robinson, H. W. 1909a; Whitfield, R. P. 1894. *Somateria dresseri*. Mackay, G. H. 1890. *Sphyrapicus*. Bolles, F. 1892a. *Spinus spinus*. Heindl, E. 1908. *Spinus t. tristis*. Wood, J. C. 1913. *Spiza*. Gross, A. O. 1921. *Steatornis*. McAtee, W. L. 1922f. *Steganopus*. Wetmore, A. 1925a. *Sterna*. Cahn, A. R. 1916. *Sterna f. fusca*. Watson, J. B. 1908. *Sterninae*. Collinge, W. E. 1926a. *Streptopelia*. Waterton, C. 1834a. *Strigidae*. Altum, B. 1863b; Cahn, A. R. & Kemp, J. T. 1930; Dury, C. 1885; Fisher, A. K. 1888b; Lataste, F. 1884; Olivier, G. 1926; Strode, W. S. 1889; Uttendörfer, O. 1934; Wemer, P. 1904. *Strigiformes*. Geyr von Schweppenburg, H. 1906; Jacobi, A. 1907. *Strix flammea*. Bernhard, — & Schneider, W. 1923; Collinge, W. E. 1919c, 1922a; Geyr von Schweppenburg, H. 1907b; Jäckel, A. J.

1866; Owen, J. H. 1911a; Ticehurst, C. B. 1935a. *Sturnella*. Bryant, H. C. 1912c. *Sturnus vulgaris*. Forrest, H. E. 1900; Lewis, H. F. 1927b. *Sylvia hortensis*. Anzinger, F. 1893a. *Syrnium*. Betts, E. S. 1927; Czynk, E. 1897. *Syrnium aluco*. Loos, C. 1905; Waterton, C. 1835f. *Syrnoides paradoxus*. Eder, R. 1889b; Harz, C. O. 1889; Smith, J. A. 1867c. Tetraonidae. Belding, L. 1892. Threskiornithinae [Ibididae]. Baynard, O. E. 1912. *Toxostoma rufum*. Gabrielson, I. N. 1913a. *Tringa*. Feilden, H. W. 1897. Trochilidae. Badier, —. 1787; Eaton, A. A. 1893b; Grew, N. 1694; Shufeldt, R. W. 1893a; Traill, T. S. 1840. *Trochilus*. Barton, B. S. 1804; Bolles, F. 1892a; Brewster, W. 1890b; Gibbs, R. M. 1892e; Lucas, F. A. 1893b; Wied-Neuwied, M. 1822. *Troglodytes*. Allen, A. S. 1921; Rope, G. T. 1889. Turdidae. Beal, F. E. 1915a, b; Forbes, S. A. 1881. *Turdus*. Bunyard, P. F. 1906. *Turdus merula*. Collinge, W. E. 1924; Wolley-Dod, C. 1881. *Turdus m. migratorius*. Jenks, J. W. 1859; Lyle, D. A. 1878; Treadwell, D. 1859; Wells, D. A. 1861; Wilcox, E. V. 1892. Tyrannidae. Beal, F. E. 1912; Cook, A. J. 1896. *Tyrannus tyrannus*. Barrows, W. B. 1894. *Tyto alba pratincola*. Reed, J. H. 1897. *Urinator* [Gavia] *arcticus*. Zedlitz, O. 1913. *Vermivora chrysopleura*. Jacobs, J. W. 1904. *Vireo philadelphicus*. Lewis, H. F. 1921. *Xanthocephalus*. Gabrielson, I. N. 1914b. *Zamelodia*. Gabrielson, I. N. 1915a. *Zenaidura*. Nice, M. M. 1921. *Zonotrichia querula*. Semple, J. B. & Sutton, G. M. 1932.

IDENTIFICATION OF INGESTED FOOD

Crop contents

Book. Text in English. Lovat, — and others 1911.

General. Rzehak, E. C. 1905a.

Germany. Helm, A. F. 1895; Loos, C. 1896a; Rzehak, E. C. 1897.

Ardea. Rowley, G. D. 1869. *Bonasa umbellus*. Weber, J. A. 1906. *Falco subbuteo*. Salzmann, E. 1906b. *Leptotilus*. Van Someren, V. G. 1926. *Tetrao tetrax*. Poulton, E. B. 1908.

Nestlings. *Zenaidura macroura*. Townsend, C. W. 1906.

Stomach contents

Books. Text in English. *Lagopus*. Lovat, — and others 1911.

Text in French. Farsky, O. 1928.

General. Bryant, H. C. 1913c; Greschik, J. 1924; Koningsberger, J. C. 1908; Marelli, C. A. 1919; Rey, J. G. 1903, 1907b; Rey, J. G. & Reichert, A. 1908; Stekhoven, J. H. 1925; Swynerton, C. F. 1912. Many species. Gil, A. 1927.

Value of such observations. Loos, C. 1904.

AFRICA

East Africa. Loveridge, A. 1922.

EUROPE

General. Beal, F. E. 1897a; Rörlig, G. 1900c; Stemmler, K. 1915.

Austria. Zdobnitzky, F. F. 1905; Zdobnitzky, F. F. & Zdobnitzky, W. 1906.

England. Hibbert-Ware, A. 1924.

France. Poncy, R. 1924, 1927-28.

Germany. Dalla Torre, K. W. 1888; Daut, K. 1915; Helm, A. F. 1895; Loos, C. 1896a; Rörlig, G. 1898a, b, 1900b, 1907a, b; Rzehak, E. C. 1897. Predaceous birds. Leisewitz, W. 1911.

Spain. Gil, A. 1927.

Switzerland. Many species. Poncy, R. 1924.

NORTH AMERICA

General. Glover, T. 1866.

Canada. Eifrig, C. W. 1910.

Florida. Baker, F. C. 1889a.

OCEANICA

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Influence of strain upon resistance to lowered air pressure. Aggazzotti, A. 1901.

Mortality of embryos. *Gallus*. Dunn, L. C. 1924e.

Polemical discussion. Davenport, C. B. 1910a.

Race relationship measured by precipitation reactions. *Columba*, *Gallus*, & *Numida*. *Glock, H. 1914.

Racial modifications. *Gallus*. Pézard, A. 1925b.

Rate of feather growth. *Gallus*. Book. Text in English and Russian. Saharova, L. N. 1926.

Throat color not correlated with song. Hansmann, A. 1855.

ATAVISM

General. Gressner, H. 1886. Creeper fowls. *Gallus*. Cutler, I. E. 1925. Hybrids of *Gallus* × *Numida*. Guyer, M. F. 1909a. *Phasianus*. Ryx, I. 1902.

Color of eggs. Alcedinidae. Hall, R. 1903a.

EXPERIMENTAL BREEDING

Many references involving experimental breeding occur in other parts of this section (**Genetics**).

General. Thomas, R. H. 1909, 1911, 1912b, 1914, 1916. *Gallus*. Pearl, R. 1914a. *Gennaeus*. Ghigi, A. 1909a, b. *Serinus*. Davenport, C. B. 1907c; *Galloway, A. R. 1909; Noorduyn, C. L. 1907a. *Struthio*. Duerden, J. E. 1918.

Drug effects. *Gallus*. Pearl, R. 1916a.

Fecundity. *Gallus*. Bittenbender, H. A. 1921; Pearl, R. 1912a, 1914a.

Fixed strains. *Gallus*. Houwink, P. 1913.

Improvement of plumes. *Struthio*. Elley, S. 1909.

Increase in number of plumes. *Struthio*. *Duerden, J. E. 1919b, c.

System of recording. Pearl, R. 1915d.

Experimental hybridization

Book. Text in German. Baur, E. 1911.

General. Braune, —. 1910a; Falss, E. 1902a; Kuiper, K. Jr. 1920; Noorduyn, C. L. 1913.

Anas. *Goldschmidt, R. 1913; Goodale, H. D. 1911b; Voiteillier, H. 1901. Anatidae. Lotsy, J. P. & Kuiper, K. 1922; *Poll, H. 1910; Poll, H. & Tiefensee, W. 1907. *Columba*. Cole, L. J., Painter, T. S., & Zeimet, A. 1928–29; Haecker, V. 1904a; Staples-Browne, R. 1912. *Columba* × *Turtur*. Bonizzi, P. 1875; Guyer, M. F. 1899. Columbidae. *Poll, H. 1910; *Whitman, C. O. 1904a, 1919b. Columbidae. Ghigi, A. 1912c, 1914c, 1915; Guyer, M. F. 1900, 1903. *Corvus*. Haecker, V. 1904b. *Dafila* × *Anas*. *Phillips, J. C. 1915a. *Euplocamus*. Mudge, G. P. 1913. Fringillidae. *Klatt, G. T. 1901; *Poll, H. 1910; Poll, H. & Tiefensee, W. 1907. *Gallus*. Bateson, W. & Punnett, R. C. 1902; Chodat, R.

1921; Ghigi, A. 1912b; Haecker, V. 1904b; Holdefleiss, P. 1911; Hurst, C. C. 1905; Poll, H. 1912; Schmidt, Johs. 1922; Serebrovsky, A. S. 1925. *Gallus* × *Numida*. Guyer, M. F. 1905a, 1909a, b, 1912a. *Gallus sonnerati* × *Gallus domesticus*. Ghigi, A. 1916a. *Gallus stanleyi*. Thomas, J. L. 1906. *Gennaesus*. Thomas, R. H. 1922. *Numida*. Ghigi, A. 1907c. Phasianidae. Ghigi, A. 1907a; Guyer, M. F. 1908; Haecker, V. 1904a, b; *Phillips, J. C. 1915a; *Poll, H. 1910, 1912; Poll, H. & Tiefensee, W. 1907; Thomas, R. H. 1912a, b, 1916. *Serinus*. *Galloway, A. R. 1909, 1912. *Streptopelia*. Strong, R. M. 1911c, 1912c.

Aberrant sex ratios. *Columba*. Cole, L. J., Painter, T. S., & Zeimet, A. L. 1928-29.

Color, form, luster, and weight of eggs. *Gallus*. Walther, A. R. 1914.

Dissociation of characters. Phasianidae. Ghigi, A. 1908b.

Distribution of traits. Bantams. Danforth, C. H. 1929a.

Fecundity of hybrids. *Columba livia* × *C. leuconata*. Ghigi, A. 1920b.

Genesis of domestic birds. Ghigi, A. 1922a.

Improvement of races by hybridization. *Anas*, *Gallus*, & *Meleagris*. Voiteillier, H. 1901.

Production of new breed by blending characters of three breeds. *Gallus*. Lamon, H. M. 1921.

Reciprocal crosses. *Columba*. Ghigi, A. 1914c. *Phasianus*. Phillips, J. C. 1913b.

Role in development of new races. Riemann, R. 1877.

Tendency of species of Anatidae to hybridize. Gloger, C. W. 1853c.

Inbreeding

Book. Text in French. Includes birds. La Perre de Roo, V. 1881.

General. *Columba*. Saint-Loup, R. 1898. *Gallus*. Cole, L. J. & Halpin, J. G. 1916, 1922; Goodale, H. D. 1927b; Dunn, L. C. 1923b.

EFFECTS ON

Egg production. *Gallus*. Goodale, H. D. 1924a; *Hays, F. A. 1924, 1924-25, 1929.

Fertility. *Gallus*. Jull, M. A. 1929b, c, 1930b.

Skeleton. *Gallus*. Dunn, L. C. 1928.

Selective breeding

Book. Text in English. Hagedoorn, A. L. & Hagedoorn, A. C. 1921.

General. *Gallus*. Pearl, R. 1912a, 1916b. Includes *Gallus*. Hagedoorn, A. L. & Hagedoorn, A. C. 1914.

Breeding males. *Gallus*. Hays, F. A. 1923.

Fecundity. *Gallus*. Pearl, R. & Surface, F. M. 1911.

Improvement of plumes. *Struthio*. Duerden, J. E. 1918, 1919d.

Mass selection. *Castle, W. E. 1915.

EGG EFFECTS ON

Size, shape, and color. *Gallus*. Benjamin, E. W. 1920.

Weight. *Gallus*. Waters, N. F. & Weldin, J. C. 1929.

NEW RACE FORMATION

General. Ghigi, A. 1916b. *Gallus*. Gourgaud, —. 1896.

New buff race. *Gallus*. Davenport, C. B. 1919.

PURE STOCK USE

General. *Gallus*. Lippincott, W. A. 1919. *Serinus*. Brandner, O. 1886.

Improvement of mongrel poultry stock by use of standard-bred cockerels. *Gallus*. Lippincott, W. A. 1920b.

Pure line concept. *Gallus*. Pearl, R. 1916b.

HEREDITY

All other publications listed under **Genetics** also involve heredity more or less directly.

Books. Text in Dutch. *Serinus*. Noorduynd, C. L. 1907b.

Text in English. Include birds. Brooks, W. K. 1883; Morgan, T. H. 1913, 1919b. *Gallus*. *Davenport, C. B. 1906b.

Text in French. Includes birds. La Perre de Roo, V. 1881.

Text in German. Baur, E. 1911. Heredity of sex. Includes *Gallus*. Witschi, E. 1929.

- General. Potts, T. H. 1884b. *Anas*. *Phillips, J. C. 1914c; Seidlitz, G. K. 1868; Stanley, H. W. 1896. *Columba*. Christie, W. & Wriedt, C. 1924; *Doncaster, L. 1912; *Ghigi, A. 1914c, 1918. *Cuculus*. Seidlitz, G. K. 1868. *Gallus*. Davenport, C. B. 1906c, 1907b; Dunn, L. C. & Jull, M. A. 1927; Frateur, L. 1914; Hertwig, P. 1923; Kopeć, S. 1926b, 1927; Lewis, H. R. 1913, 1915b; Lippincott, W. A. 1919; Mehnert, E. 1897; Mercier, L. & Poisson, R. 1925b, c, 1926a, 1927; Phillips, J. C. 1914c; Seidlitz, G. K. 1868. *Pavo*. Ghigi, A. 1928. *Phasianus*. Phillips, J. C. 1914c. *Serinus*. Davenport, C. B. 1908b; Durham, F. M. 1926; *Noorduyn, C. L. 1908. *Streptopelia risoria*. Vian, J. 1880. *Struthio*. Mehnert, E. 1897. *Vermivora leucobronchialis*. Carter, T. D. & Howland, R. H. 1923.
- Acquired characters. *Alca* & *Corvus*. Shitkow, B. M. 1907. *Fratercula*. Shitkow, B. M. 1907. *Gallus*. Hansemann, D. P. 1911. *Stercorarius*. Shitkow, B. M. 1907. *Struthio*. Lowe, P. R. 1926b. *Syrhaptes* & *Uria*. Shitkow, B. M. 1907.
- Blood sugar values. *Streptopelia*. Riddle, O. & Honeywell, H. E. 1923b.
- Body weight. *Gallus*. May, H. G. 1925.
- Callosities. *Struthio*. *Duerden, J. E. 1919d, 1920a.
- Chemical constituents of blood. *Gallus*. Koltzoff, N. K. 1928.
- Chondrodystrophia. *Gallus*. Landauer, W. & Dunn, L. C. 1930a.
- Constitution of White Leghorn breed. *Gallus*. Hadley, P. B. 1913a, b, 1915.
- Differences in reciprocal crosses. *Columba*. Ghigi, A. 1914c. *Gallus*. Tschermak, A. 1917.
- Dorsosacrum. *Gallus*. Promptov, A. N. 1928.
- Eugenic bearing of experimental work. *Gallus*. Pearl, R. 1910b.
- Fertility. *Gallus*. Hays, F. A. & Sanborn, R. 1924.
- First crowing of rooster in morning. *Gallus*. Hottinger, R. 1926.
- Genotype sex differences. *Gallus*. Pézard, A. & Caridroit, F. 1927b.
- Growth rate. Asmundson, V. S. & Lerner, I. M. 1933.
- Habit. Butler, A. G. 1897c.
- Hatchability of eggs. Dunn, L. C. 1923f. *Gallus*. Hays, F. A. & Sanborn, R. 1924; Pearl, R. 1910a, 1911d.
- Head crest. Book. Text in German. *Anas* & *Gallus*. Krautwald, F. 1910. *Serinus*. *Duncker, H. 1923a, 1924.
- Length of beak. *Columba*. Lienhart, R. 1928.
- Memory. Holden, J. S. 1879.
- Mutation. Feathers on neck. *Gallus*. Davenport, C. B. 1914a, b.
- Pathological characteristics of heredity. *Gallus*. Freund, L. 1925.
- Phylogenetic characters. Effects on development. *Gallus* & *Struthio*. Mehnert, E. 1897.
- Potentialities of heredity. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1924i, 1925d.
- Size. *Anas*. Phillips, J. C. 1912b, 1914c.
- Skull and brain of Polish fowl. *Gallus*. Daresté, C. 1865d.
- Specific characters. Birds incidental. Sumner, F. B. 1923.
- Spurs. In female. *Gallus*. Goodale, H. D. 1925a.
- Transmission from female to egg. Riddle, O. 1910.
- Uropygeal gland characters. Johanson, I. 1927.
- Vigor, constitutional. *Gallus*. Rogers, C. A. 1914. Includes birds. Book. Text in English. Colored plates. Anatidae. Bonhote, J. L. 1915.
- Weight. *Gallus*. Punnett, R. C. & Bailey, P. G. 1914.
- Anomalies**
- Anomalies in races of *Gallus*. Regnault, F. 1907.
- Creeper fowl condition. Cutler, I. E. 1925.
- Dwarfism. Mayhew, R. L. & Upp, C. W. 1932; Rensch, B. 1923a.
- Giantism. *Gallus*. *Rensch, B. 1923a.
- Rumplessness. *Gallus*. Dunn, L. C. 1925b, 1926a; Dunn, L. C. & Landauer, W. 1924; Landauer, W. 1928; Landauer,

W. & Dunn, L. C. 1925; Lang, A. 1912; Ulm-Erbach, H. 1886.

Tendency to lay eggs with two yolks. *Gallus*. Féré, C. 1899a.

HEAD ANOMALIES

General. *Gallus*. Turnbull, H. M. 1913.

Cranial (cerebral) hernia. Polish fowl. *Gallus*. Dareste, C. 1867a. Ghigi, A. 1912b, 1916b, 1923b.

Eye anomalies. *Columba*. Wriedt, C. & Christie, W. 1925.

PLUMAGE ANOMALIES

Absence of lipochrome pigment. *Duncker, H. 1927b.

Featherless race. *Gallus*. Hecht, E. 1901.

Frizzled plumage. *Gallus*. Hutt, F. B. 1930a. Scotch Dumpie and Frizzle fowls. *Gallus*. Landauer, W. 1930a.

"Porcupine" feathers. *Columba*. Cole, L. J. & Hawkins, L. E. 1930.

Silky feathering. *Gallus*. Jones, S. V. 1921. Silky and woolly feathers. *Gallus*. Taubert, F. 1910. Silky and Yokohama fowl hybrids. Bonhote, J. L. 1914b.

TOE ANOMALIES

Complex of brachydactyly, syndactyly, and ptilopody (leg feathering). *Gallus*. *Danforth, C. H. 1919a, b, 1929a.

Hyperdactyly (polydactyly). *Gallus*. Barfurth, D. 1908a, b, 1909, 1910, 1911a, b, c, d, 1914.

Left-sided incidences of supernumerary digit. *Gallus*. Bond, C. J. 1920b, 1926; *Davenport, C. B. 1909c; Dunn, L. C. & Jull, M. A. 1927; Matthias, K. 1912.

Syndactyly (webfoot). Davenport, C. B. 1909c, 1910e. *Columba*. Bonhote, J. L. 1911b; Staples-Browne, R. 1905, 1906.

Color

General. *Columba*. Cole, L. J. 1911; Lloyd-Jones, O. 1913; Metzelaar, J. 1928; *Staples-Browne, R. 1908, 1912. Columbidae. Nuttall, J. S. 1918. *Gallus*. Dunn, L. C. 1923a. *Melopsittacus*. Duncker, H. 1928.

Barring factor. *Gallus*. Goodale, H. D. 1909; Lewis, H. R. 1915b.

"Blue" color. *Gallus*. *Lippincott, W. A. 1921a.

Breast color. *Gallus*. Warren, D. C. 1930c.

Color races in poultry. Haecker, V. 1921.

Egg color. *Gallus*. Punnett, R. C. & Bailey, P. G. 1920.

Factor hypothesis in plumage color. *Gallus*. Davenport, C. B. 1909b.

Plumage color in poultry crosses. Dunn, L. C. 1922b.

Relation of white and "blue" colors. *Gallus*. Lippincott, W. A. 1923b.

Skin color. *Gallus*. Lambert, W. V. & Knox, C. W. 1927.

Somatic segregation of factors for plumage color. *Meleagris*. Robertson, W. R. 1925.

White plumage. *Columba*. Walker, J. R. 1925. *Gallus*. Bateson, W. 1905. *Serinus*. *Duncker, H. 1923b, 1924.

COLOR PATTERN

General. *Cole, L. J. 1914. *Aegialitis* & *Charadrius*. Lowe, P. R. 1914. *Columba*. *Bonhote, J. L. & Smalley, F. W. 1911; *Jones, S. V. 1922; Loisel, G. 1905b. *Gallus*. Blanchon, H. L. 1911; Davenport, C. B. 1910c; Hays, F. A. 1926a; Knox, C. W. 1927; Pearl, R. 1916g; *Pearl, R. & Surface, F. M. 1910b, d; Tjebbes, K. 1926.

Barring. *Gallus*. Punnett, R. C. & Pease, M. S. 1921.

Black and white. *Gallus*. Jull, M. A. & Quinn, J. P. 1929.

Pied plumage. *Gallus*. Punnett, R. C. & Pease, M. S. 1927.

Spangling. *Gallus*. Lefèvre, G. & Rucker, E. H. 1923.

Unusual changes. *Gallus*. Godbey, C. B. & Reid, D. H. 1931.

White spotting. Anatidae. Jaap, R. G. 1933.

EYE COLOR

General. *Cuculus*. Wynne-Edwards, V. C. 1933.

Red eyes. *Serinus*. Noorduynd, C. L. 1906a.

PIGMENTATION

General. *Columba*. Lloyd-Jones, O. 1915. Columbidae. Loisel, G. 1904b. *Gallus*. Davenport, C. B. 1912a; *Pearl, R. & Surface, F. M. 1910d; Punnett, R. C. & Pease, M. S. 1921. *Serinus*. Philpitschenko, J. A. 1919.

Factor for black pigmentation in White Leghorn breed. *Gallus*. Hadley, P. B. 1914c.

Pigmentation of the silky fowl. *Gallus*. Bateson, W. & Punnett, R. C. 1910-11.

Comb characters

General. *Gallus*. Asmundson, V. S. 1926; Davenport, C. B. 1911b; Pearl, R. & Pearl, M. D. 1909.

"Walnut" comb. *Gallus*. Bateson, W. & Punnett, R. C. 1905.

Disease

Bacillary white diarrhea. Roberts, E. & Card, L. E. 1926.

Diphtheria. *Gallus*. Frateur, L. 1924.

Inheritance in rabbits of immunity to fowl cholera. Hadley, P. B. 1914a.

Resistance or immunity to disease. General. *Gallus*. Roberts, E. 1927.

Typhoid. *Gallus*. Lambert, W. V. & Knox, C. W. 1928.

SUSCEPTIBILITY OR TENDENCY TO DISEASE

Bacillary white diarrhea. *Gallus*. Rettger, L. F., Kirkpatrick, W. F., & Jones, R. E. 1914.

Fowl sarcoma. Ikeda, T. 1930.

Egg characteristics

Egg weight. *Gallus*. *Hadley, P. B. & Caldwell, D. W. 1920; Waters, N. F. & Weldin, J. C. 1929.

Resemblance of sisters in mean weight of eggs produced. *Gallus*. Atwood, H. 1926b.

Experimental studies

Book. Text in German. *Gallus*. Baur, E. 1911.

General. *Anas*. Loisel, G. 1905d. *Columba*. *Wriedt, C. & Christie, W. 1925. *Gallus*. Davenport, C. B. 1907c; Loisel, G. 1905d; Serebrovsky, A. S.

1925. *Gennaesus*. Ghigi, A. 1909a. *Serinus*. Davenport, C. B. 1907c, 1908b.

Offspring from eggs produced by transplanted ovaries influenced by mother in color characters. *Gallus*. Guthrie, C. C. 1907, 1908.

Factors in heredity

General. Haecker, V. 1912.

Chondriosomes as units or bearers. *Gallus*. Meves, F. 1908.

Factors responsible for feather characteristics are in feather follicles. Danforth, C. H. & Foster, F. 1927.

Influencing fertility and hatchability. *Gallus*. Pearl, R. & Surface, F. M. 1909c.

Inhibitors of pigment formation. *Gallus*. Dunn, L. C. 1925a.

Sex determining factors. *Gallus*. Morgan, T. H. 1917a.

SEX CHROMOSOMES

See also under Cytology and Sex.

General. *Davenport, C. B. 1912b.

Constitution of sex chromosomes. Columbidae hybrids. Cole, L. J., Painter, T. S., & Zeimet, A. 1928-29.

Genes for

General. Includes *Gallus*. Morgan, T. H. 1917b.

Crossing over in sex chromosomes. *Gallus*. Goodale, H. D. 1917a; Serebrovsky, A. S. 1922; Serebrovsky, A. S. & Wassina, E. T. 1926.

Extension of black pigment. *Gallus*. Dunn, L. C. 1922a; Lippincott, W. A. 1923a.

Hybridization effect. Tschermak, A. 1917.

Inhibiting comb development. *Gallus*. Petroff, S. G. 1929.

Lethal gene. *Gallus*. Dunn, L. C. 1923c. "Creepers" variation. *Gallus*. Dunn, L. C. & Landauer, W. 1926.

Somatic nondisjunction of chromosomes carrying genes for skin color. *Gallus*. Lambert, W. V. 1929.

Somatic segregation of genes. *Gallus*. Serebrovsky, A. S. 1925.

Feathers

Down feathers on toes. *Gallus*. Warren, D. C. 1930c.

Leg-feathering. *Gallus*. Danforth, C. H. 1929a; Punnett, R. C. & Bailey, P. G. 1918.

Rate of feathering. *Gallus*. Warren, D. C. 1925.

Shank feathering. *Gallus*. Lambert, W. V. & Knox, C. W. 1929.

NUMBER OF FEATHERS

General. *Columba*. *Morgan, T. H. 1918.

Number of tail feathers. *Columba*. Johansson, I. 1927.

Fecundity

General. *Gallus*. Goodale, H. D. 1916a, 1918c, 1919a, b, 1924a, b; Harris, J. A. & Lewis, H. R. 1923a; *Pearl, R. 1910b, 1911b, c, 1912c, 1915b; *Pearl, R. & Surface, F. M. 1909b, d, e.

Fecundity inherited through male. *Gallus*. Hays, F. A. & Sanborn, R. 1923.

Statistical study. *Gallus*. Dunn, L. C. 1924g.

Winter egg production. *Gallus*. Goodale, H. D. 1918b; Goodale, H. D. & Macmullen, G. 1919.

Instinct

General. Butler, A. G. 1897d; Weissenborn, W. 1838.

Brooding instinct. Goodale, H. D., Sanborn, R., & White, D. 1920. *Gallus*. Punnett, R. C. & Bailey, P. G. 1920.

Nest-building instinct. Hand-reared birds. *Zamelodia* [*Hedymeles*] *ludoviciana*. Scott, W. E. 1904c.

Mendelian heredity

Publications considering the application of Mendel's law.

General. Gill, E. L. 1922; Schultz, W. 1915.

Anas. Goldschmidt, R. 1913. *Anatidae*. Schultz, W. 1913. *Columba*. Ewart, J. C. 1910; *Whitman, C. O. 1919b. *Columbidae*. Nuttall, J. S. 1918; Schultz, W. 1915. *Compothylpidae*. Hybrids. Morss, N. 1926. *Fringillidae*. Schultz, W. 1913. *Gallus*. Blanchon, H. L. 1912; *Cunningham,

J. T. 1912, 1919; Davenport, C. B. 1906a, 1907a, 1910b; Lefèvre, G. 1917; Lefèvre, G. & Rucker, E. H. 1916. Includes *Gallus*. Hagedoorn, A. L. & Hagedoorn, A. C. 1914. *Metopia peposaca* × *Netta rufina*. Neunzig, R. 1924c. *Phasianus*. Thomas, R. H. 1912a, 1915. *Serinus*. *Duncker, H. 1923a, 1924; Heron, D. 1910. *Streptopelia*. Strong, R. M. 1911c, 1912c; Tange, M. 1932. Blue Andalusian fowl. *Gallus*. Lippincott, W. A. 1918.

Exception to Mendel's law. Noorduyn, C. L. 1906b.

Inversion of dominance. *Gennaeus*. Ghigi, A. 1920a.

Multiple coupling of factors. *Gallus*. Wilson, J. 1915.

Production of pile breed. *Gallus*. Cunningham, J. T. 1912, 1919.

Relation to sex hormones. *Gallus*. Pézard, A. 1927b.

Seasonal effects on Mendelian segregation and sex ratios. *Columba* & *Gallus*. Christie, W. & Wreidt, C. 1930.

Spurious allelomorphism. Includes *Gallus*. Spillman, W. J. 1908.

COLOR

General. *Columbae* & *Serinus*. *Little, C. C. 1920.

Black color. *Gallus*. Frateur, L. 1914.

Sex

General. Gironcoli, S. 1890. *Gallus*. Hagedoorn, A. L. 1909; *Morgan, T. H. 1919a. *Serinus*. Durham, F. M. 1908, 1926.

Experimental study of eggs producing male birds. *Columba*. Riddle, O. 1912c.

Female heterozygous for sex. *Gallus* & *Serinus*. Hagedoorn, A. L. 1909.

Secondary sexual characters. Includes birds. *Cunningham, J. T. 1908. *Phasianus*. Thomas, R. H. 1914.

Sex ratio. *Anas*. *Phillips, J. C. 1914c. *Gallus*. Jull, M. A. 1932a; Lambert, W. V. & Curtis, V. 1929; Lambert, W. V. & Knox, C. W. 1926; *Phillips, J. C. 1914c. *Phasianus*. *Phillips, J. C. 1914c.

SEX-LINKED INHERITANCE

General. Brooksbank, H. 1922; *Cole, L. J. & Kelley, F. J. 1919. Includes birds. Cole, L. J. 1913.

Columba. Cole, L. J. 1912; *Staples-Browne, R. 1912; Steele, D. G. 1925. *Columbae*. Morgan, T. H. 1913, 1917a, 1919a. *Galli*. Pézard, A. & Caridroit, F. 1922b. *Gallus*. *Davenport, C. B. 1911a, 1912b; Goodale, H. D. 1910a, 1911a; Hadley, P. B. 1910b, 1913b; Haldane, J. B. 1921; Lefèvre, G. 1916; Lewis, H. R. 1915b; *Morgan, T. H. & Goodale, H. D. 1912; Pearl, R. 1915b, c; Pézard, A. & Caridroit, F. 1924; Punnett, R. C. 1923; Rucker, E. H. 1916; Serebrovsky, A. S. 1925; *Sturtevant, A. H. 1911, 1912; Warren, D. C. 1924. *Serinus*. *Davenport, C. B. 1912b. *Streptopelia*. Strong, R. M. 1912a, c.

Change in sex linkage with age. *Gallus*. Haldane, J. B. & Crew, F. A. 1925.

Crossing over of sex-linked genes. *Columbae*. Bridges, C. B. 1913. *Gallus*. Agar, W. E. 1924; Serebrovsky, A. S. 1922.

Sex-linked barred pattern. *Gallus*. Dunn, L. C. 1924d; *Pearl, R. & Surface, F. M. 1910a, d.

Special characters

Comb. *Gallus*. Taibell, A. 1930b; Wilson, J. 1912.

Fecundity. *Gallus*. *Pearl, R. 1912b, c, 1913c, 1915b.

Voice

General. *Luscinia* & *Serinus*. Duncker, H. 1922.

Hand-reared birds. *Zamelodia* [*Hedymeles*] *ludoviciana*. Scott, W. E. 1904c.

Song. Braun, F. 1915a; Witchell, C. A. 1892b. *Agelaius phoeniceus*. Scott, W. E. 1904b. *Dolichonyx oryzivorus*. Scott, W. E. 1904b. *Luscinia* & *Serinus*. Duncker, H. 1922.

ORIGIN OF DOMESTIC BIRDS

General. Lotsy, J. P. & Kuiper, K. 1922. Includes birds. Geoffroy Saint-Hilaire, I. 1859.

Origin and operation of changes in races of domestic birds. Lavalley, A. 1911.

Origin and history of races of poultry, including pigeons

Classification of races of fowls. Dechambre, P. 1895.

Poultry. Lotsy, J. P. & Kuiper, K. 1922; Scheidemann, G. 1888. Include poultry. Keller, C. 1913.

Anser

Includes domestic goose. Keller, C. 1912. Domestic and Chinese geese. Goodacre, F. B. 1879.

Columba

Domestic pigeon. *Ghigi, A. 1908c, 1914c; Martell, P. 1926; Townsend, C. W. 1915. "Tumbling" pigeons. Howes, G. B. 1901.

Statistical study of origin of domestic pigeon. Loisel, G. 1905e.

Gallus

Book. Text in English. Gurney, J. F. Jr. 1921.

General. Davenport, C. B. 1914c; Ghigi, A. 1912a; Jeitteles, L. H. 1878; Lotsy, J. P. 1920; Martell, P. 1929; Palacky, J. 1885; Phillips, E. C. 1881, 1885b; Pichot, P. A. 1914; Raggi, L. 1904; Sainville, E. 1910; Stubbs, F. J. & Rowe, A. J. 1912; Tegetmeier, W. B. 1890.

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Jungle fowl. *Gallus bankiva*. Ball, S. C. 1933. Ancient records (3000-4000 B.C.) in Babylonia. Stresemann, E. 1924d.

Long-tailed breed of fowls in Japan. Chamberlain, B. H. 1899; *Cunningham, J. T. 1901, 1903; Dean, B. 1907; Finn, F. 1901a; Forbin, P. 1908; Gloger, C. W. 1860b.

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Meleagris gallopavo

Domestication. Caton, J. D. 1877.

Domestic turkey. Pennant, T. 1781; Wright, A. H. 1914.

Numida

Ancestry. Ghigi, A. 1907c.

Serinus

Canary in wild state. Bolle, C. 1858.

Establishment of white race. Martin, M. S. 1913.

Streptopelia risoria

Origin of ring dove. Oustalet, J. F. 1901.

PLUMAGE PECULIARITIES

Albinism. Schifferli, A. 1920a.

Cock-feathering. *Gallus*. Eliot, T. S. 1928.

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Hen-feathering of male

General. Koehler, O. 1922. *Gallus*. Danforth, C. H. 1928, 1929a; Eliot, T. S. 1928; Feldman, H. W. 1927; Pease, M. S. 1922.

Effect of thyroid gland removal on hen-feathering. Crew, F. A. 1927a.

Factors in hen-feathering. Lowering of endocrine stimulus for cock-feathering. Raising of threshold at which feather follicles respond to this stimulus. *Gallus*. Danforth, C. H. 1930.

Genetic factor for hen-feathering. Seabright Bantam. Morgan, T. H. 1920d.

Origin of hen-feathering. Cunningham, J. T. 1924-25.

Skin transplantation experiments. *Gallus*. Danforth, C. H. 1929b, c; Danforth, C. H. & Foster, F. 1927.

REVERSION

General. *Columba*. Ghigi, A. 1911; Staples-Browne, R. 1906. *Gallus* & *Serinus*. Davenport, C. B. 1910d.

Mendelian explanation. Davenport, C. B. 1910d.

Reversion case of Darwin explained on Mendelian basis. Davenport, C. B. 1909a.

SEX

General. *Columbae*. *Riddle, O. 1916a.

Persistence of sex characters in feathers of skin graft, also sex reversal. *Gallus*. Danforth, C. H. 1928, 1929b.

Sexual selection. *Polyplectron*. Finn, F. 1902g.

Significance of sex hormones. *Gallus* & *Gennaeus*. Cuénot, L. 1923.

XENIA

Possibility of male influencing color of eggs fertilized by him.

General. Bulman, G. P. 1901; Gladstone, H. S. 1911a; Gröbbels, F. 1934; Heinroth, O. 1913.

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Experimental study. *Gallus*. Kopeć, S. 1926a. *Gallus* hybrids. Holdefleiss, P. 1911.

GLANDS

A limited number of references to glands are given here. The more important glands such as the thyroid, suprarenal, etc. are entered separately. References to glands of various organs will be found entered under these structures, as a rule.

Book. Text in German. Gadow, H. 1891d.

Carotid gland. Kose, W. 1902, 1904.

Ducts of glands. Physiology. Rhythmic contractions. Brown-Séquard, C. E. 1858b.

Glandular bodies in adipose tissue of greater omentum near spleen. *Struthio*. Vallillo, G. 1910.

Oviducal glands. Secretion. Riddle, O. & Spohn, A. A. 1916.

ALIMENTARY CANAL, GLANDS OF

General. Jobert, C. 1873b; Leydig, F. 1854a.

Crop glands. Histology and physiology. Hasse, C. 1865.

Esophageal glands

Development. *Gallus*. Schumacher, S. 1925b, 1926.

Phylogeny. *Androglossa*. Greschik, J. 1917a.

Intestinal glands

Histology. *Lagopus*. Schumacher, S. 1921.

Stomach glands

See also under **Alimentary canal**.

Structure and function. Includes *Columba*. Nussbaum, M. 1877.

Histology. Wilczewski, P. 1870. *Aquila*, *Casuaris*, *Rhamphastidae*, *Rhea*, & *Struthio*. Remouchamps, E. 1880.

GIZZARD

Histology. *Columba*. Wiedersheim, R. E. 1872.

Reactions of gland cells to stains. *Anas*, *Columba*, & *Gallus*. Pilliet, A. H. 1886.

BURSA FABRICII

Glands of the bursa Fabricii. *Columba*. Retterer, E. 1885b. *Columbidae*. Riddle, O. 1928b. *Gallus* & *Uria*. Retterer, E. 1885b.

HEAD GLANDS

Histology. *Columba*. *Teichmann, M. 1889.

Ear glands. External auditory meatus. *Anas*, *Asturinus*, & *Columba*. Di Colo, F. 1909. *Gallus*. Di Colo, F. 1909; *Schwalbe, G. A. 1890. *Meleagris* & *Phasianus*. Di Colo, F. 1909. *Tetrao*. *Schwalbe, G. A. 1890.

Gl. mandibularis. Histology and cytology. *Iynx*. *Greschik, J. 1913.

Glands of mouth and nasal chambers. Innervation. Includes *Anas*, *Anser*, & *Gallus*. Gaupp, E. W. 1888.

Mucus glands of head. *Picus*. Wolf, J. 1805a.

Gl. lacrimalis

General. Hosch, F. 1876; Pilliet, A. 1889. Many species. Coues, E. B. 1868-69; Franz, V. 1924.

Structure of Gl. lacrimalis. Includes birds. Tillaux, P. 1859.

HISTOLOGY

General. *Columba*, *Corvus*, *Falco*, *Gallus*, *Struthio*, & *Tetrao*. Sardemann, E. 1888.

Duct. *Gallus*. Bertin, E. J. 1769.

Golgi apparatus. *Anas*. Bowen, R. H. 1926.

Gl. nasalis (Nasolacrimal or supra-orbital gland)

General. Pilliet, A. 1889; Wettschlesloff, M. 1900. Many species. Nitzsch, C. L. 1820; Nitzsch, C. L. & Giebel, C. G. 1866a; Selby, P. J. 1834; *Technau, G. 1936; Willink, H. D. 1899b. Includes birds. Parker, W. K. 1888c.

Anser. *Müller, J. P. 1830b; Rochas, F. 1886. *Diomedea*. Bennett, G. 1834c. *Podoa surinamensis*. Giebel, C. G. 1861b. *Steatornis caripensis*. Müller, J. P. 1841.

Anatomy. Many species. Jobert, C. 1869.

Function. *Charadrius*. Smith, J. N. 1923.

DEVELOPMENT

General. *Pygoscelis papua*. *Ask, F. 1913.

Effect of salt water. Schildmacher, H. 1932.

DUCTS

General. Includes *Anas*, *Buceros*, *Buteo*, *Gallus*, & *Psittacus*. *Hoffmann, B. 1882.

Homology of medial portion of duct with Jacobson's organ. Ganin, M. S. 1890.

Posterior portions of ducts represent reduced Jacobson's organs. *Ganin, M. S. 1890.

Gl. nictitans (Harder's Gland)

General. Hosch, F. 1876; Jacobson, L. L. 1813; Leydig, F. 1854a; Pilliet, A. 1889. Many species. Coues, E. B. 1868-69; Franz, V. 1924. Includes birds. Altmann, R. 1889. *Anas*. MacLeod, J. 1879. *Anser*. Müller, J. P. 1830b; Rochas, F. 1886. *Steatornis caripensis*. Müller, J. P. 1841.

Development. *Pygoscelis papua*.
*Ask, F. 1913.

Histology. Taddei, D. 1900. *Anas*.
MacLeod, J. 1879; *Peters, A. 1891.
Anser, *Fringilla*, & *Gallus*. *Peters, A.
1891.

Physiology. Taddei, D. 1900.

Glandulae salivales

Including various salivary glands.

Books. Text in English. Owen, R.
1866-68.

Text in German. Gadow, H. F.
1891d. *Gallus*. Heidrich, P. K. 1905;
*Höltling, H. 1912.

General. Batelli, A. & Giacomini, E.
1887-89, 1892; Cholodkovsky, N. A.
1892; *Heidrich, P. K. 1908. Include
birds. Duvernoy, G. L. 1804, 1811a;
Ranvier, L. A. 1884.

Aegithalos. Tichomirov, B. 1925.
Anas. Pilliet, A. H. 1889, 1893a.
Anser. Müller, J. P. 1830b; Reichel, P.
1883. *Columba*. *Reichel, P. 1883.
Corvus. Müller, J. P. 1830b. *Cypselus*.
Batelli, A. 1890a. Galli. Batelli, A.
1890b. *Gallinula*. Müller, J. P. 1830b.
Gallus. Pilliet, A. H. 1893a, b; *Reichel,
P. 1883. *Larus* & *Lestris*. *Reichel, P.
1883. *Otis*. Murie, J. 1869. *Paridae*
& *Parus*. Tichomirov, B. 1925. *Procellaria*.
Reichel, P. 1883. *Regulus*.
Greschik, J. 1918b; Tichomirov, B.
1925.

Development. Giacomini, E. 1890.

Histology. Antony, M. 1920; Batelli,
A. & Giacomini, E. 1892. Include birds.
Bernard, C. 1852; Botezat, E. 1910a;
Giacomini, E. 1890. *Accentor*, *Coccothraustes*,
Coturnix, & *Cypselus*. Batelli,
A. & Giacomini, E. 1889. *Gallus*.
Heidrich, P. K. 1908. *Gecinus*, *Pica*,
Strix, & *Turdus*. Batelli, A. & Giacomini,
E. 1889.

Phylogeny of salivary glands.
Botezat, E. 1910a.

Physiology of salivary glands.
Botezat, E. 1910a. *Gallus*. Heidrich,
P. K. 1905. Includes birds. Bernard,
C. 1852.

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Development. *Anas* & *Passer*. Kallius,
E. 1905. *Melopsittacus*. Kallius,
E. 1906.

UROPYGEAL GLAND

Books. Text in German. Gadow,
H. F. 1891c. Many species. Nitzsch,
C. L. & Burmeister, C. C. 1840.

General. Coupin, H. 1914; *Schmidt,
F. 1924; Tyson, E. 1683. Many species.
Kossmann, R. 1871; Schumacher,
S. 1919. Includes birds. Altmann, R.
1889.

Anas. Pilliet, A. H. 1889. *Anser*.
Plato, J. 1902. *Circus*. Pilliet, A. H.
1889. *Columbae*. Garrod, A. H.
1874d. *Gallus*. Crisp, E. 1862a;
Pilliet, A. H. 1889. *Passer* & *Spheniscus*.
Pilliet, A. H. 1889.

Abnormal sebaceous horn-shaped ex-
crecence. *Vanellus*. Ticehurst, C. B.
1910b.

Development of uropygeal gland.
Lunghetti, B. 1903, 1905. *Gallus*.
Lunghetti, B. 1902; Orlandi, S. 1902.

Feathers on gland. Figures for many
species. Paris, P. 1910.

Good figures of entire gland. Many
species. Granvik, H. 1913.

Significance in treatment of rickets
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Taxonomic consideration of uropy-
geal gland. *Psittacidae*. Garrod, A. H.
1874e.

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H. S. 1861; Morris, F. O. 1836b;
Trouessart, E. L. 1906; Waterton, C.
1832b, 1860. Many species. Crisp, E.
1860; Paris, P. 1906b, 1910, 1913.

Electrical characteristics. *Strix flammea*.
Schauer, E. 1877.

SECRETION

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Anas & *Anser*. *Stern, M. 1905a.
Linota cannabina. Monterosso, B.
1915.

Extirpation effects. *Anas*. Joseph,
M. 1891.

Fetid secretion. *Upupa*. Ghidini,
A. 1906; Wigger, P. 1906.

Relation of secretion to oil and
milk secreted by mammals. *Anatidae*.
Jonge, D. 1878.

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General. *Lunghetti, B. 1907. Many
species. Crisp, E. 1860; Paris, P.

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Cytology. *Linota cannabina*. Monte-rosso, B. 1915.

GRAFTS

Comprising publications involving experimental grafting or transplantation of tissues and organs. See also under Embryology, Teratology, and Urogenital system.

Adult organ grafts into embryos. *Gallus*. Murphy, J. B. 1916.

Effects on secondary sex characters. *Gallus*. Domm, L. V. 1931b.

Heteroplastic tissue grafting. Defense mechanism. *Gallus*. Murphy, J. B. 1912, 1913, 1914a, b, 1926.

Homo- and heteroplastic grafts. Eggs and tissues of embryos and adult animals. Includes birds. Ikematsu, T. 1923.

Individuality of tissues. Birds incidental. Loeb, L. 1921.

Lymphocyte, role in grafting. *Gallus*. Murphy, J. B. 1926.

Shell membrane use. *Gallus*. Book. Text in German. Haug, R. 1889.

Subcutaneous graft. Eye. *Gallus* embryo. Féré, C. 1897c.

Suprarenal glands into young birds. Columbidae. Riddle, O. & Minoura, T. 1923.

Thyroid gland. *Columba*. Cristiani, H. 1904. *Gallus*. Cristiani, H. 1904; *Willier, B. H. 1923, 1924.

EMBRYONIC GRAFTS

General. *Gallus*. Tiesenhausen, M. 1909.

Development of organs in embryonic grafts into skin of adult birds. *Gallus*. Féré, C. & Elias, H. 1898.

Embryonic tissue from different animal species. *Anas* & *Gallus*. Kiyono, K. & Sueyasu, Y. 1917.

Fate of embryonic tissue mixed with tumor tissue—myxosarcoma. *Anas*, *Columba*, & *Gallus*. Mukoyama, T. & Yagi, K. 1923.

Fragments. *Gallus*. Murray, P. D. & Huxley, J. S. 1925a.

Internal shell membrane use in heteroplastic grafts. Amat, C. 1895.

Reaction to embryonic grafts. *Gallus*. Féré, C. 1897e.

BLASTODERM

Developmental potencies of parts of early blastoderm. *Gallus*. Hoadley, L. 1926a.

Fate. *Gallus*. Féré, C. 1895g.

Forty-eight hour stage. Teratoma formation. Féré, C. 1897o.

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Relation to sexual differentiation. *Gallus*. Greenwood, A. W. 1925a, b.

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Sex not modified by host. *Gallus*. *Willier, B. H. 1925, 1927b.

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Interchange of limbs. *Gallus*. Peebles, F. 1910.

Longitudinal halves. *Gallus*. Selby, D. & Murray, P. D. 1928.

Self differentiation. *Gallus*. Murray, P. D. & Huxley, J. S. 1925b.

Subcutaneous. Strangeways, T. S. & Fell, H. B. 1926.

MAMMALIAN TISSUE TRANSPLANTED IN BIRD EMBRYO

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Rat embryo tissue into bird embryos. *Gallus*. Hiraiwa, Y. K. & Willier, B. H. 1927.

Chorio-allantoic grafts

Blastoderm portion containing heart and liver rudiments. *Gallus*. *Willier, B. H. & Rawles, M. E. 1931a.

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Gonads. *Gallus*. Corinaldesi, F. 1926, 1927a, b.

Gonads and non-gonadic tissue. *Gallus*. Corinaldesi, F. 1926; *Willier, B. H. & Yuh, E. C. 1928.

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Ovary grafts. Effects on the embryo. *Gallus*. Minoura, T. 1921.

Reactions. *Gallus*. Huxley, J. S. & Murray, P. D. 1924.

Skin. *Gallus*. Murray, P. D. 1928a.

Spleen tissue. *Gallus*. *Dantschakoff, W. 1918a, b.

Testes. Effects on the embryo. *Gallus*. Minoura, T. 1921.

DIFFERENTIATION

General. *Gallus*. Hoadley, L. 1924, 1925.

Anas tissue on *Anas* and *Gallus*. Sandstrom, C. J. 1932.

Capacity of blastoderm. *Gallus*. *Willier, B. H. & Rawles, M. E. 1931b.

Isolated liver and pancreatic primordia in chorio-allantoic grafts. *Gallus*. Holton, R. G. 1929.

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Kidney tissue of *Anas* on *Anas* and *Gallus*. Sandstrom, C. J. 1932.

GONAD GRAFTS

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General. Includes birds. Steinach, E. 1919a. *Anas*. Poll, H. 1909. *Gallus*. Caridroit, F. 1926; Field, G. W. 1901b; Finlay, G. F. 1925; Goodale, H. D. 1918a; Guthrie, C. C. 1910; Hanau, A. 1897; Pézard, A. 1926, 1928; Pézard, A., Sand, K., & Caridroit, F. 1923a; Poll, H. 1909. *Netta*. Poll, H. 1909. *Serinus*. Schultz, W. 1915.

Cross transplantation of gonads. *Gallus*. Roxas, H. A. 1926.

Histology of graft. Greenwood, A. W. 1928.

Transplanting gonads into cocks and capons. *Gallus*. Domm, L. V. 1928b.

VARIOUS EFFECTS

Endocrine. *Gallus*. Pézard, A. 1911c, 1921c; Pézard, A., Sand, K., & Caridroit, F. 1924h.

Plumage. *Gallus*. Greenwood, A. W. 1928.

Sex. Pézard, A. 1918.

Ovary grafts

General. *Anas*. Kaltenbach, R. 1917.

Development and function. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1924a.

Failure to function. *Gallus*. Davenport, C. B. 1910c, 1911c.

Functioning grafts. *Gallus*. *Guthrie, C. C. 1907, 1908, 1910.

Into offspring. *Gallus*. Guthrie, C. C. 1911.

Plumage effects. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1926g.

Regeneration of extirpated ovaries. *Davenport, C. B. 1911c.

Testis development in interior. *Gallus*. Caridroit, F. & Pézard, A. 1925.

OVARY GRAFTS INTO MALE

Castrated male. Sex hormone effects. *Gallus*. Domm, L. V. 1928c; Goodale, H. D. 1917b.

Effect on race characters. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1924f, 1.

Feminization. *Gallus*. *Goodale, H. D. 1914, 1918a.

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General. *Gallus*. Caridroit, F. & Régnier, V. 1929b; Löde, A. 1895; Pézard, A. 1913b, d.

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Juvenile testicular tissue into hypertrophied right gonad of ovariectomized bird. *Gallus*. Domm, L. V. 1930c.

Plumage and secondary sex character effects. *Gallus*. Foges, A. 1898, 1903.

Survival of testis graft in presence of active ovary. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1924j.

INTEGUMENTAL GRAFTS**Comb grafts**

On back, head, and legs. *Gallus*. Kozelka, A. W. 1929.

HOMOPLASTIC GRAFTS

Elimination of innervation in testing for sex hormone effects. *Gallus*. Caridroit, F. 1925b.

Fragments of comb. Male hormone effects. Caridroit, F. & Pézard, A. 1926.

Skin transplants with observations on feather development

General. *Gallus*. Danforth, C. H. & Foster, F. 1927.

Crests of crested fowl. *Gallus*. Klatt, B. 1917; Mauclair, —. 1923.

Subcutaneous. Hybrids. Schultz, W. 1913.

White plumage retained on brown bird. *Gallus*. Kozelka, A. W. 1929.

PATCHES OF SKIN TO OTHER SPECIES

General. Columbidae & Fringillidae. *Schultz, W. 1912.

Guinea-pig skin on to *Columba*. Loeb, L. & Addison, W. H. 1908.

Skin grafts of *Columba* onto *Columba*, *Gallus*, frog, guinea pig, and rabbit. Loeb, L. & Addison, W. H. 1911.

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General. *Gallus*. Masui, K. 1930.

Feathers retained sex characters. *Gallus*. Danforth, C. H. 1928.

Sex reversal. *Gallus*. Danforth, C. H. 1929b.

Spur grafts on

Back and legs. *Gallus*. Kozelka, A. W. 1929.

HEAD

General. *Gallus*. Behrends, —. 1890; Brunotte, C. 1907; Gadeau de Kerville, H. 1896; Kozelka, A. W. 1929; Wardrop, J. 1840.

Capons. *Gallus*. Book. Text in Italian. Redi, F. 1688.

Comb. Féré, C. 1900e; Graf, H. 1926; Philipeaux, J. M. 1872.

Heteroplastic grafts. *Gallus*. V., D. 1899.

TUMOR GRAFTS

Chicken sarcoma into embryo. *Gallus*. Murphy, J. B. & Rous, F. P. 1912.

Different animals into *Anas* & *Gallus*. Kiyono, K. & Sueyasu, Y. 1921.

Rat sarcoma into

Adult bird. *Gallus*. Shirai, C. 1923.

Brain. Includes birds. Shirai, C. 1922. *Columba*. Yamazaki, K. 1922.

Embryo. *Gallus*. Murphy, J. B. 1912.

GROWTH

See also under Embryology and Life histories.

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Anas. Horton, D. H. 1928; Titus, H. W. 1928b. *Aquila chrysaetos canadensis*. Sumner, E. L. 1929. *Aquila gluchii*. Sushkin, P. P. 1896a. *Bombus*. Phillips, G. G. 1913. *Bubo v. virginianus*. Gardner, L. L. 1929; Reed, B. P. 1925. *Calypte*. Woods, R. S. 1922. *Cariama cristata*. Heinrich, O. 1924a. *Carpodacus mexicanus frontalis*. Bergtold, W. H. 1914; Keeler, C. A. 1890. *Circus hudsonius*. Shelley, L. O. 1935. Include *Columba*. Brody, S. and others 1926, 1930.

Cuculus. Bahr, P. H. 1908a; Gurney, J. H. Jr. 1905. *Falco sparverius*. Sherman, A. R. 1913b. Falcones. Sumner, E. L. 1933. *Gallus*. Féré, C. 1901a; Henderson, D. C. 1928; Hendricks, W. A. & Lee, A. R. 1929; Latimer, H. B. 1932; Mairs, T. I. 1908; Mitchell, H. H., Card, L. E., & Hamilton, T. S. 1926; Phillips, A. G. 1916a; *Schmalhausen, I. 1927. Include *Gallus*. Brody, S. and others 1926, 1930. *Guara*. Beebe, C. W. 1914c. *Hirundo erythrogaster*. Stoner, D. 1935b. *Hylocichla*. Perry, W. A. & Perry, E. M. 1918. Include *Meleagris*. Brody, S. and others 1926, 1930. *Nycticorax n. naevius* [hoactli]. Gross, A. O. 1923a. *Poocetes g. gramineus*. Perry, W. A. & Perry, E. M. 1918. Include *Struthio*. Brody, S. and others 1926, 1930. *Turdus m. migratorius*. Wells, D. A. 1861. *Zenaidura*. Nice, M. M. 1921.

In laboratory. *Gallus*. Drummond, J. C. 1916-17.

Unequal growth. *Accipiter nisus*. Warga, K. 1929b.

Variation in growth. *Gallus*. Funk, E. M., Khandel, H. C., & Callenbach, E. W. 1930.

Growth of various structures

General. *Gallus*. Latimer, H. B. 1925a.

Appendages of head. *Gallus*. Domm, L. V. 1930b.

Beak. Kohn, A. 1877.

Body. Columbidae. Riddle, O. 1928b.

Cells. *Columba*. Kaufman, L. 1925.

Comb. Fluctuations. *Gallus*. Benoit, J. 1927d; Smith, G. 1911.

Connective tissue in tissue culture. *Gallus*. *Carrel, A. 1913b, 1914.

Epidermis. Compared with guinea pig. *Columba*. *Addison, W. H. & Loeb, L. 1913.

Heart. Hasebroek, K. 1917.

Muscles. *Columba*. Kaufman, L. 1926b.

Ovary. *Gallus*. Sindo, T. 1929; Stieve, H. 1918.

Spleen. *Gallus*. Carrel, A. & Burrows, M. T. 1911.

Weights compared. *Gallus*. Latimer, H. B. 1925c.

Wings. Changes in proportions during development. Measurements. Marples, B. J. 1930.

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Singing on nest. By male only. Gibbs, R. M. 1893b.

Temperature effects. *Charadrius apricarius altifrons* & *Turdus pilaris*. Pitt, F. 1929.

Time of day when eggs are laid. Boyes, F. 1876b; Christy, R. M. 1883; Payne, J. W. 1898; Saxby, S. H. 1876.

Usually breed in first season. *Riparia r. riparia*. Stoner, D. 1937b.

Variation. Cockerell, T. D. 1889; Rzehak, E. C. 1890; Schuster, L. 1904.

War effects. Vallon, G. 1920.

Weather effects. Bau, A. 1910.

Brooding habits

General. Dunlop, E. B. 1912. *Gallus*. Bräss, M. 1917.

Brooding of eggs. Monroe, H. C. 1899.

Male brooding young hatched in incubator. *Perdix*. Fortune, R. 1911.

Preceding laying. Owen, J. H. 1920.

Thermo-biological study of brooding. Book. Text in German. Fischer, J. 1913.

Young and parent return to nest at night for 20 days. *Fulica americana*. Hollister, N. 1919.

Care of young

General. Herrick, F. H. 1900; Raspail, X. 1903c. Many species. Raspail, X. 1903d. *Cannabina linota*. Raspail, X. 1904c. *Emberiza cirrus*. Raspail, X. 1903a. *Poliophtila c. caerulea*. Nice, M. M. 1932a. *Pyrrhula*. Raspail, X. 1899a.

Acridotheres tristis feeding young of *Sturnia contra*. Inglis, C. M. 1910.

Orphaned young fed by other individuals of species. MacIntyre, D. 1919.

Removing matter from mouths of nestlings by parents. Owen, J. H. 1913b.

Young of first brood assisting in feeding second brood. *Hirundo*. Goldsmith, H. S. 1890.

CARRYING YOUNG (USUALLY FROM ELEVATED NESTS) ALLEGED

General. Gloger, C. W. 1860f; Hartert, E. J. 1887; Wied-Neuwied, M. 1863. *Anthus*. Lengerken, H. 1924. *Charadrius auratus*. Laidlaw, T. G. 1888. *Gallinula*. Gurney, S. 1854. *Mergus*. Lumsden, J. 1898. *Philohela minor*. McDermid, C. C. 1914. *Scolopax r. rusticola*. Hart, H. C. 1889; Rzehak, E. C. 1906; St. Quintin, W. H. 1926b; Stendall, J. A. 1926; Sword, J. and others 1912. *Somateria*. Hallock, C. 1874. *Vanellus*. Service, R. 1892.

Carrying young from tree nests to water. *Aix sponsa*. Forbush, E. H. 1922a.

Critical discussion. Szikla, G. 1887. *Clangula*. Brewster, W. 1900.

FEEDING OFFSPRING

General. Leichtentritt, B. 1919b; McAtee, W. L. 1915c; Stephens, T. C. 1917a.

Accipiter cooperi. Roddy, H. J. 1888. *Accipiter n. nissus*. Penrose, F. G. 1914. *Buteo pennsylvanica* & *Cathartes aura*. Roddy, H. J. 1888. *Fringilla bengalus*. Lapicque, L. & Lapicque, M. 1911. *Melospiza* & *Spizella*. Jones, L. 1913. *Syrnium nebulosum*. Roddy, H. J. 1888. *Troglodytes*. Jones, L. 1913.

Frequency of feeding young. Wemer, P. 1907b.

Male feeding young. Falconiformes and Strigiformes. Brehm, C. L. 1855a.

Methods of feeding young. *Accipiter n. nissus*. Meade-Waldo, E. G. 1914.

Regurgitative feeding. Myers, H. W. 1910; Stephens, T. C. 1917a. Many species. *Wheelock, I. G. 1905. Book. Text in English. *Wheelock, I. G. 1904. *Bombycilla cedrorum*. Post, K. C. 1916. *Coragyps atratus*. Audubon, J. J. 1831-39. *Uraeginthus*. Decoux, A. 1915.

Tendency for older nestlings to get bulk of food. Youngest sometimes die from starvation. Dunlop, E. B. 1912.

Food used

See also under Food.

Flies. *Hirundo*. Horne, E. 1924.

Fruit. *Tyrannus intrepidus*. Slade, E. 1883.

Water

Given to young by parents. *Ciconia*. Cerva, F. 1908.

Supply for young in nest. Osmaston, B. B. 1909b.

Wetting food intended for offspring. *Turdus migratorius*. Nash, F. P. 1893.

Incubation

General. *Anas*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Apteryx*. Bartlett, A. D. 1868b. *Chlidonias nigra surinamensis* & *Corvus*. Dunlop, E. B. 1915. *Dromiceius*. Milne-Edwards, A. 1896a. *Falco*. Scott, D. A. 1914. *Gallus*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Hydroprogne caspia imperator* & *Larus delawarensis*. Dunlop, E. B. 1915. *Megapodidae*. Oustalet, J. F. 1880a. *Meleagris* & *Numida*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Otus*. Raspail, X. 1890. *Palaeognathae*. Slater, P. L. 1863. *Pavo*. Baudrimont, A. E. & Saint-Ange, M. 1843. *Struthio*. Cawston, E. 1899; Geoffroy Saint-Hilaire, I. 1858; Hardy, J. 1858; Romanes, G. J. 1883.

Artificial incubation. See also under Poultry culture. Haskins, C. H. 1921.

Damage by loud noises. Garmann, C. F. 1670b.

Mortality during incubation. Dunlop, E. B. 1910, 1915.

Origin of incubation habits. Fezandie, C. 1893.

Ovitegous habit, i.e. beginning incubation with laying of first egg. Dunlop, E. B. 1915.

PERIOD OF INCUBATION

Books. Text in English. Many species. *Bergtold, W. H. 1917a. Owen, R. 1866-68, p. 257. *Colinus*. Stoddard, H. L. 1931. *Corvus f. frugilegus*. Yeates, G. K. 1934. *Struthio*.

Mosenthal, J. & Harting, J. E. 1879. *Haliaeetus leucocephalus*. Herrick, F. H. 1934. *Tympanuchus cupido americanus*. Gross, A. O. 1930.

Text in French. Many species.
Cornevin, C. E. 1895.

Text in German. Many species.
Gadow, H. F. 1891d.

General. Brock, S. E. 1910a; *Burns, F. L. 1915b; Butler, A. G. 1905a, c; Davy, J. 1864b; Dunlop, E. B. 1910; *Evans, W. 1891, 1892; Gillespie, T. H. 1919; Gröbbels, F. & Möbert, F. 1927a; Gross, A. O. 1927a; Gurney, J. H. Jr. 1899b; Heinroth, O. 1922; Rey, J. G. 1867; Schaeck, F. 1902; Shaw, W. 1926; Weber, H. C. 1876. Many species. Burns, F. L. 1915b; Newman, T. H. 1905; Raspail, X. 1903d; Sclater, P. L. 1859a. British birds. Brown, R. H. 1926; Carlyon-Britton, R. 1926; Longstaff, T. G. & Jourdain, F. C. 1926a, b. Captive birds. Zollikofer, E. H. 1927a. Domestic birds. Weber, H. C. 1876. Sea-birds. Witherby, H. F. 1908a.

Accipiter n. nisus. Blagg, E. W. 1911b; Brown, R. H. 1925; Salter, J. H. 1894. *Aiz. Dixon*, J. S. 1924. *Amazilia t. tzacatl*. Skutch, A. F. 1931. *Anas*. Jardel, E. 1916; Tessier, H. A. 1817. *Anas rubripes tristis*. Wright, H. W. 1919. Anatidae. Blaauw, F. E. 1919b; Heinroth, O. 1906a. *Anser*. Tessier, H. A. 1817. *Astur g. gentilis*. Kuhk, R. 1924; Weland, E. 1924. *Athene noctua*. Detmers, E. 1907b. *Butalis grisola*. Raspail, X. 1903b. *Calypte*. Woods, R. S. 1922. *Cannabina linota*. Raspail, X. 1904c. *Caprimulgus europaeus*. Heinroth, O. 1909a. *Carpodacus mexicanus frontalis*. Bergtold, W. H. 1914; Keeler, C. A. 1890. *Casuaris*. Le Prestre, F. 1871. *Charadrius curonius*. Ziemer, E. 1893b. *Colaptes*. Burns, F. L. 1900. *Columbae*. Whitman, C. O. 1919a. *Columbidae*. Raspail, X. 1907b, 1915a. *Colymbus auritus*. Dubois, A. D. 1919. *Crypturus tataupa*. Seth-Smith, D. 1903. *Cuculus*. Ingram, C. 1908a; Noble, H. 1908; Raspail, X. 1895a. *Cygnus*. Tessier, H. A. 1817. *Dendrocygna*. Dickey, D. R. & van Rossem, A. J. 1923. *Dendroica a. aestiva*. Bigglestone, H. C. 1913. *Dendroica c. caerulescens*. Harding, K. C. 1931. *Dendroica v. virens*. Nice, M. M. 1932c. *Dromaeus [Dromiceius]*. Le Prestre, F. 1871; Tegetmeier, W. B. 1868b. *Dumetella carolinensis*. Gabrielson, I. N. 1913b;

Whittle, H. G. 1920. *Ectopistes migratorius*. Deane, R. 1896. *Emberiza cirius*. Raspail, X. 1903a. *Emberiza citrinella*. Raspail, X. 1892c. *Falco a. aescalon*. Rowan, W. 1922b. *Falco peregrinus*. Scott, D. A. 1914. *Falco sparverius*. Sherman, A. R. 1913b. *Gallus*. Bucknell, —. 1839; Darcet, —. 1766; Viller, —. 1770. *Gavia stellata*. Johnson, R. A. & Johnson, H. S. 1935. *Grus*. Cosgrave, R. 1911. *Haliaeetus leucocephalus*. Herrick, F. H. 1932. *Leipoo*. Bellchambers, T. P. 1916; Morgan, A. M. 1917a; 58–77 days. *Leucosticte tephrocotis littoralis*. Shaw, W. T. 1936. *Ligurinus chloris*. Raspail, X. 1904b. *Lophortyx g. gambeli*. Gorsuch, D. 1934. *Melospittacus undulatus*. Tourneux, F. & Tourneux, J. P. 1901. *Micropus apus*. Steele-Elliott, J. 1901. *Mimus*. Daniels, J. W. 1902. *Molothrus*. Friedmann, H. 1927a; Hudson, W. H. 1874a. *Molpastes*. Law, S. C. 1924. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Nyroca fuligula*. Trevelyan, H. 1908. *Oedicnemus oedicnemus*. Meade-Waldo, E. G. 1907. *Otocoris*. MacDonald, H. 1916. *Oxyechus v. vociferus*. Bates, J. M. 1916; Ganier, A. F. 1934. *Palaeognathae*. Sclater, P. L. 1863. *Passeriformes*. Raspail, X. 1896b. *Pavo*. Tessier, H. A. 1817. *Phalacrocorax graculus*. Raeburn, H. 1895. *Phasianus*. Tessier, H. A. 1817. *Philohela minor*. Cottam, C. & Kelso, L. 1933. *Phoenicopterus ruber*. Chapman, F. M. 1905. *Pica caudata*. Raspail, X. 1896a. *Poliophtila c. caerules*. Nice, M. M. 1932a. *Progne*. Jacobs, J. W. 1903. *Prunella modularis*. Raspail, X. 1903c. *Puffinus brevicaudus*. Gabriel, J. 1914. *Pycnophilus floccosus*. Howe, F. E. 1907. *Pygocelis*. Gain, L. 1912. *Pyrrhula*. Raspail, X. 1899a. *Rhynchotus*. Bartlett, A. D. 1868a. *Spheniscus*. Gillespie, T. H. 1923. *Spiza americana*. Gross, A. O. 1921. *Steganopodes [Pelecaniformes]*. Jourdain, F. C. 1913. *Streptopelia*. Raspail, X. 1897b. *Talgalla*. Bartlett, A. D. 1860b. *Tringa*. Paton, E. R. 1922; Patterson, J. D. 1913; Turney, H. B. 1913. *Troglodytes a. aëdon*. *Baldwin, S. P. 1921a. *Vireo b. belli*. Nice, M. M. 1929a. *Vireo philadelphicus*. Lewis, H. F. 1921.

Hybrids of *Anas* & *Cairina*, which have respectively 28 days and 35 days. Heinroth, O. 1906a.

Relation to body and egg weights. Heinroth, O. 1922.

SEX OF INCUBATING BIRD

General. Many species. Pickwell, G. B. 1930.

Both male and female incubating. *Buteo vulgaris*. Kempen, C. 1905. *Struthio*. Harting, J. E. 1883b.

Male incubating. Raspail, X. 1893a. *Casuaris*. Geoffroy St. Hilaire, A. 1882. *Cygnus atratus*. Milne-Edwards, A. 1897. *Falco p. peregrinus*. Stewart, J. C. 1897. *Fringilla coelebs*. Raspail, X. 1892d.

Irregular or unusual breeding

General. Wigglesworth, L. W. 1890; Williams, R. 1896. *Pyrrhonorax*. Zollikofer, E. H. 1927b.

Cuckoo hatching its own eggs. Müller, A. 1889.

Eggs in nests of other species. See also under Communal habits. Griffith, A. F. 1878; Williams, R. 1896.

Food supply relation. Tropical birds. Quelch, J. J. 1898-99b.

Membranous lining of cloaca inflated during sexual excitement by a particular bird. *Coracopsis vasa*. Sclater, P. L. 1884.

Removing nesting material to another site. Congreve, W. M. 1924a.

Nest construction and architecture

Book. Text in English. Rennie, J. 1831.

General. Fleury, E. 1920; Gröbbels, F. 1925c; Hublard, E. 1899; König-Warthaussen, R. 1889; Landois, H. 1881b, 1882b, e; Oustalet, J. F. 1883; Reuseliuss, B. M. 1897; Schacht, H. 1869. *Dendroica magnolia*. Nice, M. M. 1926. *Panyptila*. Sclater, P. L. 1897b. *Poliophtila c. caerulea*. Nice, M. M. 1932a. *Stellula calliope*. Weydemeyer, W. 1927.

Arrangement of eggs in nest. Gibbs, R. M. 1893a. Position of eggs in nest. *Oryechus v. vociferus*. Pickwell, G. 1925a.

Captive birds weaving nests. *Quelea*. Friedmann, H. 1922.

Factors determining time of nest-building. Many species. Wemer, P. 1907a.

Flowers in nest. H., J. M. 1887; White, W. 1887.

Plumage color relations. Wallace, A. R. 1868a, b; Anon. 1869a.

References to Greek classics. Book. Text in German. Pischinger, A. 1907.

Sanitation in nest. Cathelin, F. 1920a; Herrick, F. H. 1900. *Agelaius*. Gabrielson, I. N. 1915c. *Dendroica*. Bigglestone, H. C. 1913. *Dendroica c. caerulescens*. Nice, M. M. 1930d. *Toxostoma*. Gabrielson, I. N. 1912.

Size of nests. Gröbbels, F. 1925c.

Snake skins in nests. Strecker, J. K. 1926, 1927; Teachenor, D. 1927. *Myiarchus crinitus*. Whittle, C. L. and others 1927. *Passerina c. cyanea*. Suthard, J. 1927.

Temperature effects. *Corvus*, *Cyanocitta*, & *Parus*. Ragsdale, G. H. 1894b.

Variations in nest-building correlated with climate. Gloger, C. W. 1854i.

DOMED NESTS

General. Moffat, C. B. 1909.

Use for protection from cold, for concealment, and for defense. Ussher, R. J. 1909.

MOUND BUILDING

Incubation of eggs in mound without brooding. Megapodidae. Books. Text in English. Chisholm, A. H. 1935; Dixon, C. 1897a.

General. Campbell, A. J. 1885, 1903. *Catheturus*. *Le Souëf, W. H. 1899; St. Quintin, W. H. 1904. *Leipoa ocellata*. Ashby, E. 1929; *Le Souëf, W. H. 1899; Mattingley, A. H. 1908d. *Megapodius*. Banfield, E. J. 1913; Friedländer, B. 1899; *Le Souëf, W. H. 1899; Reichenow, A. 1896; Anon. 1896d. *Talegalla lathamii*. Bartlett, A. D. 1860b.

MULTIPLE NESTS (OFTEN DUMMY)

Book. Text in English. Herrick, F. H. 1935.

General. Gloger, C. W. 1859b. *Erithacus*. Owen, J. H. 1911b. *Telmatodytes p. palustris*. Welter, W. A. 1935.

Double nests

General. Greenwood, H. 1867.

One alongside other and both containing eggs. *Vireo olivaceus*. Jones, L. 1904b.

OLD NESTS USED

General. Detmers, E. 1910. *Cypselus apus*. Tschusi zu Schmidhoffen, V. 1910. Hirundinidae. Storey, W. 1895.

Old nests of other species

General. *Tringa solitaria*. Street, J. F. 1923.

Nests of *Pica* used by *Gallinula*. Elliott, J. S. 1915.

SITES OF NESTS

City roof. *Chordeiles*. Townsend, M. B. 1916.

Telegraph poles for nests when trees are absent. *Furnarius rufus*. Machon, F. 1926.

Unusual. Trees. *Gallinula chloropus*. Lewis, S. 1899.

Which sex selects nesting locality. Mousley, W. H. 1921b.

UNUSUAL NESTS

General. *Furnarius*. Ménégau, H. A. 1909.

Peculiar nest cavity. *Dryocopus m. martius*. Leverkühn, P. 1891b.

Unusual nesting sites. *Colinus*. Osgood, W. H. 1893. *Nyroca fuligula*. Trevelyan, H. 1908. *Parus c. cristatus* & *Parus m. major*. Walter, Adolf 1877b.

Number of broods or sets of eggs per season

General. *Mousley, W. H. 1917c. *Emberiza hortulana*. Schuster, L. 1926b. *Sturnus vulgaris*. Eder, R. 1889a; Hauptvogel, A. 1889; Knauer, F. K. 1889; Ticehurst, N. F. 1913.

Interval between broods. Powell, T. G. 1924.

Mates for second brood. Nice, M. M. 1930a.

Rearing of second brood. Few do, though second, third, and fourth sets of eggs may be laid when preceding sets are destroyed. Australia. McGilp, J. N. 1925.

Time-period before second set of eggs after destruction of preceding set. Congreve, W. M. 1924b.

Parasitic breeding habits

Books. Text in English. Aristotle 1910; Chance, E. P. 1922; Chisholm,

A. H. 1935; *Friedmann, H. 1929; Japp, A. H. 1899; Whistler, H. 1935.

Text in French. Girod, P. 1891.

Text in German. Leverkühn, P. 1891a. Includes *Cuculus*. Aristotle 1868.

General. Laying eggs in nests of other species. Friedmann, H. 1927b. *Coccyzus*. Widmann, O. 1882. Cuculinae. Bacmeister, W. 1927; Barrett, C. L. 1905; Bartels, M. Jr. 1925; Blackwall, J. 1824a, 1831a; Brehm, R. 1855; Campbell, A. G. 1907, 1915; Dove, H. S. 1920; Friedmann, H. 1928b; Gloger, C. W. 1853e, 1854d, g. *Cuculus*. Altum, B. 1866d; Atkinson, E. W. 1894; Baker, E. C. 1922a, 1923; Bau, A. 1908b; Blyth, E. 1835a; Bolam, G. 1914; Brandes, G. 1896a; Bunyard, P. F. 1926; Capek, V. 1926; Chance, E. P. 1919, 1921, 1923a, b; Chance, E. P., Bunyard, P. F., and others 1923; Cipriani, L. 1926; Clauder, G. 1689; Forbin, P. 1912; Godwin-Austen, H. H. 1899; Hanf, P. B. 1875; Hartert, E. J. 1890; Ihering, H. 1914a; Jenner, E. 1788; Jourdain, F. C. 1917, 1925; Kollibay, P. R. 1901; Michel, J. 1890; Nibe, T. 1917; Oustalet, J. F. 1892; Raspail, X. 1889; Rensch, B. 1927a; Rey, J. G. 1872b, 1894a, 1895a, b, 1896, 1905b; Roberts, N. 1909; Sarasin, P. 1924; Schlegel, R. 1915; Scholey, G. J. 1924; Smith, A. C. 1873a, c; Swynnerton, C. F. 1917a, 1918b; Thienemann, G. 1908; Thienemann, G. W. 1853; Thomson, J. A. 1890; Walter, Adolf 1876, 1886, 1889, 1891, 1893; Wenzel, K. 1908; Williams, G. 1899. *Cuculus canorus*. Beick, W. 1926; Ceppi, L. 1908; Gurney, J. H. Jr. 1905; Meiklejohn, R. F. 1917; Müller, A. & Müller, K. 1887; Sardinka, M. 1877. *Cuculus poliocephalus*. Kawaguchi, M. 1915. *Eudynamis honorata*. Dewar, D. 1907. *Eudynamis taitensis*. North, A. J. 1896a. *Molothrus*. Bendire, C. E. 1895; Darwin, C. R. 1882; Friedmann, H. 1927b, 1930c; Stephens, T. C. 1917b. *Molothrus bonariensis*. Millsum, O. 1909. Ploceidae. Neunzig, R. 1929. *Urodynamis* [*Eudynamis*] *taitensis*. Fulton, R. 1904.

Adoption of eggs. *Cuculus*. Raspail, X. 1894a, b, c.

Cuculus feeding young. Klein, E. 1911.

Expulsion of eggs and young of foster parent from nest. Cuculidae. Bernard,

P. 1902; Campbell, A. G. 1915; Hancock, J. 1884-89; Høyer, J. 1918.

Origin of parasitic habits. *Cuculus*. Haacke, W. 1896b. *Molothrus*. Widmann, O. 1897.

COLOR OF EGGS

General. *Cuculus*. Snell, F. H. 1859.

Resemblance of eggs to host species. Schenk, J. 1904; Smith, A. C. 1868a, b, 1873a, b; Wachs, H. 1922b.

HOST SPECIES

General. Brehm, R. 1855. *Chalcococcyx*. Hall, R. 1901a. *Cuculus*. Stimming, R. 1927.

Both seed- and insect-eating birds are hosts for *Cuculus*. Wolf, J. 1806.

Cuckoo fed by two pairs of honey-eaters. Brent, A. E. 1906.

List of hosts for *Molothrus*. Friedmann, H. 1934a.

Parasitic breeding habits in relation to *Phylloscopus*. *Cuculus*. Schiermann, G. 1927a.

OVIPOSITION

Depositing of eggs

General. *Cuculus*. Ephraim, O. 1908; Horne, E. & Tucker, B. W. 1924.

Deposition of egg, in laying, directly into nest of victim. *Molothrus a. ater*. Jacobs, J. W. 1923.

Desperate efforts to deposit egg in nest difficult of access. *Cuculus*. Howard, H. E. 1919.

TWO BIRDS REARED IN ONE NEST

General. *Cuculus*. Le Souëf, W. H. 1907.

Swallow reared in nest with *Cuculus*. Wolley-Dod, C. 1892.

Various matings

See also under Behavior.

General. Shufeldt, R. W. 1907c.

Mates change usually each year and often for a second brood. *Riparia r. riparia*. Stoner, D. 1937b. *Troglodytes a. aëdon*. Baldwin, S. P. 1921a.

Mating for more than one season. Whittle, C. L. 1926.

Monogamy. Detmers, E. 1913. *Scolopax r. rusticola*. Luzecki, O. J. 1907.

Polyandry. *Calopezus*. Seth-Smith, D. 1904a. *Rhea*. Astley, H. D. 1907. *Turdus merula*. Noack, T. 1910.

Polygamy. Detmers, E. 1913; Jacobi, J. 1864; Rhoads, S. N. 1890. *Accipiter nisus*. Hughes-Onslow, J. 1925. *Corvus*. Dunlop, E. B. 1917. *Euplectes hordeacea*. Lack, D. 1935. *Quiscalus [Cassidix]*. Chapman, F. M. 1898b. *Scolopax r. rusticola*. Luzecki, O. J. 1907.

Young of tree-nesting Anatidae getting to water

General. Brewster, W. 1900; Szikla, G. 1887.

Length of period before young of ducks nesting at same distance above water, get to water. Anatidae. Homeyer, A. 1868b.

CAPTIVITY, HABITS IN

General. Finn, F. 1892b.

Apteryx. Stoner, D. 1923a. *Apteryx mantelli*. Newton, A. 1852. *Calopezus*. Seth-Smith, D. 1904a. *Casuarus*. Sheak, W. H. 1923. *Cuculus*. Mellerish, W. L. 1896. *Dromaeus [Dromiceius]*. Harting, J. E. 1891b; Sheak, W. H. 1923. *Dryobates m. major*. Macpherson, H. A. 1883a. *Ectopistes*. Craig, W. 1913b; Deane, R. 1896. *Grus*. Astley, H. D. 1901. *Hylocichla guttata*. Owen, D. E. 1897. *Lanius collurio*. Günther, A. C. 1905. *Nanopterum harrisi*. Townsend, C. H. 1929. *Nyctea scandiaca*. Gurney, J. H. 1875b, 1880. *Otis*. Eldred, E. J. 1909; Horsbrugh, C. B. 1906b. *Paradisaea apoda*. Sányál, R. B. 1895. *Phalacrocorax*. Blake-Knox, H. 1866b. *Phaps elegans*. Seth-Smith, D. 1904b. *Psittacus indicus*. Hauth, —. 1900-01. *Rhea*. Fothergill, H. 1902; Sheak, W. H. 1923. *Sphenisciformes*. Sokolowsky, A. 1908. *Sphyrapicus v. varius*. Bolles, F. 1892b. *Strix*. Bolles, F. 1890. *Struthio*. Garrod, A. H. & Darwin, F. 1872; Hardy, J. 1860; Sheak, W. H. 1923. *Tragopan*. St. Quintin, W. H. 1903. *Tyto*. Cohen, D. A. 1899. *Zenaidura*. Nice, M. M. 1921. *Zenaidura graysoni*. Gifford, E. W. 1927.

Breeding in captivity

General. Zollikofer, E. H. 1927a. Ardeae. Sányál, R. B. 1897. *Dromiceius*. Milne-Edwards, A. 1896a; Zawadowsky, M. M. 1926d. *Europyga*.

Bartlett, A. D. 1868a. *Hesperiphona*.
Fleming, J. H. 1903. *Larus*. Gough,
T. 1843. *Nothoprocta perdicaria*. Smith,
C. B. 1908. Peacock parrot. Gabriac,
P. J. 1823. *Phalacrocoracidae*. Sányál,
R. B. 1897. *Phasianus* & *Rhynchotus*.
Bartlett, A. D. 1868a. *Talegalla*
lathamii. Bartlett, A. D. 1860b.

Mound-building. *Cathartus lathamii*.
St. Quintin, W. H. 1904.

Weaving nests. *Quelea*. Friedmann,
H. 1922.

CHANGES IN HABITS

General. Beveridge, G. 1920; Bren-
inger, G. F. 1905; Kimcoll, F. H. 1894;
Loewis, O. 1881b. *Didunculus strigi-*
rostris. Whitmee, S. J. 1875b.

Civilization effects. Fowler, S. P.
1860.

Recent changes. British birds. Wil-
son, William 1911.

Breeding habit changes

General. Harvie-Brown, J. A. 1896.

Forty-year period. *Hirundo urbana*.
Pouchet, F. A. 1870.

COMMUNAL HABITS

See also under Ecology and Social
relations.

Flocking. *Chaetura pelagica*. Witchell,
C. A. 1896c. *Sturnus vulgaris*. Savage,
E. U. 1922. Unmated birds in breeding
season. *Sturnus vulgaris*. Tischler, F.
1908.

136,000,000 birds in one nesting
colony. *Ectopistes*. Schorger, A. W.
1927.

Gregariousness

General. Forstner, G. G. 1907.

Roosts. Cummings, B. F. 1908.
Corvus b. brachyrhynchus. Edwards,
C. L. 1888. *Turdus*. Brewster, W.
1890c.

Unusual communal habits

Eggs of two or more species in one nest.
See also under Ecology: Commensal-
ism.

General. Mawson, G. 1865; Smith,
A. C. 1880.

Duck, partridge, and pheasant.
Blagg, E. W. 1886.

Ducks and partridges. Gurney,
J. H. Jr. 1876b.

Gallinago and *Totanus*. Sargent, J.
1886b.

Larus argentatus and *Larus fuscus*.
Mills, H. H. 1903.

Lyrurus and *Perdix*. Sargent, J.
1886a.

Mergus serrator and *Tadorna tadorna*.
Zedlitz, O. 1927b.

Phasianus and *Scolopax*. Birley,
F. H. 1887.

Pheasant and wild duck. Haigh,
G. H. 1886.

Sturnus vulgaris and *Columba o.*
oenas. Hewett, W. 1881.

DISPLAY HABITS

See also under Behavior.

General. *Alcedo*. Marsden, W. M.
1927.

"Booming." *Tympanuchus*. Bere-
man, T. A. 1893.

Drumming habits

General. *Bonasa u. umbellus*. Glea-
son, L. R. 1924; Jones, L. 1905; Tuttle,
H. E. 1919. *Gallinago*. Bahr, P. H.
1907, 1912a; Evans, W. 1889, 1908;
Headley, F. W. 1904; Lynes, H. 1913;
Stares, J. 1895; Witherby, H. F. 1907a.
Scolopax. Bahr, P. H. 1912a.

Drumming with beak. *Dryobates* &
Melanerpes. Huxley, J. S. 1919a.
Picus. Landois, H. 1893. *Picus v.*
viridis. Helm, A. F. 1893.

Strutting. See also under Behavior.
Centrocercus urophasianus. Horsfall,
R. B. 1920.

DIVING HABITS

See also under Locomotion.

General. Forbush, E. H. 1922b.
Cinclus. Cordier, A. H. 1927. *Larus*.
Cummings, S. G. 1913. *Opisthocomus*.
Quelch, J. J. 1898-99a.

Ability to sink in water. Hagen, W.
1909.

Depth of diving. *Fulica*. Reaches
bottom in at least 25-foot depth of
water. Evermann, B. W. 1902.

Period of diving 16 seconds for *Fulica*. Evermann, B. W. 1902.

Position of wings in diving. *Colymbus*. Burtch, V. 1914.

Taking young. *Podilymbus p. podiceps*. Strong, R. M. 1912f.

DRINKING HABITS

Diagrams and cross sections through beak and tongue. Trochilidae. Steinbacher, G. 1935a.

Salt water. Wynne-Edwards, V. C. 1935b. *Puffinus*. Coles, R. J. 1925.

Sap. *Sphyrapicus* and Trochilidae. Wright, A. A. & Wright, A. H. 1918.

Young birds. Morgan, C. L. 1896b; Nash, F. P. 1893. Columbidae. Craig, W. 1912b. *Gallus* incidental. Craig, W. 1912b.

FEEDING HABITS

See also under **Economic ornithology** and **Food**.

Books. Text in English. Davis, J. R. 1903. *Lagopus*. Lovat, S. J. and others 1911.

General. Beal, F. E. & McAtee, W. L. 1912; Beebe, C. W. 1906b; Butts, W. K. 1927; Csörgey, T. 1922; Gabrielson, I. N. 1922; Grinnell, J. & Wythe, M. W. 1927; Hall, E. R. 1923; Kojima, T. 1927; Lowe, J. 1896; McAtee, W. L. 1920d; Samuels, E. A. 1866; Wallace, A. R. 1890. Many species. Rozenfelds, M. 1929. Blood-sucking birds. Moller, W. 1931. British game birds. Collinge, W. E. 1917c. Nearctic birds. McAtee, W. L. 1932d. Sea birds. Collins, J. W. 1884.

America

NORTH AMERICA

Book. Text in English. Coues, E. B. 1877.

United States

General. Marshall, W. 1887.

California. Beal, F. E. 1910.

Georgia. Burleigh, T. D. 1927.

Kentucky. Blincoe, B. J. 1923.

Maryland farm. Judd, S. D. 1902.

Nebraska. Bruner, L. 1896.

Ohio. Kellicott, D. S. 1898.

Hawaiian Islands. Perkins, R. C. 1906.

Australia

General. Ashby, E. 1927.

Europe

Book. Text in German. Arnold, F. 1897.

British Isles. Hewitt, C. G. 1908-09.

France. Madon, P. 1926a.

Germany. Brehm, C. L. 1831a.

VARIOUS BIRDS

Accipiter. Farren, W. 1914. *Agelaius*. Allen, A. A. 1914b; Soriano, P. S. 1931. *Alca torda*. Frohawk, F. W. 1910b. *Ampelis* [*Bombycilla*] *cedrorum*. Beal, F. E. 1892. *Anas platyrhynchos*. McAtee, W. L. 1918d. Anatidae. Mabbott, D. C. 1920. *Anous s. stolidus*. Watson, J. B. 1908. *Aphelocoma c. californica*. Mailliard, J. 1900a. *Archibuteo ferrugineus* [*Buteo regalis*]. Cameron, E. S. 1914. *Archilochus colubris*. Pickens, A. L. & Garrison, L. P. 1931. *Ardea*. Zimmer, J. T. 1918. *Ardea cinerea*. Detmers, E. 1908. *Artamus*. Fryer, J. C. 1913a. *Asio f. flammeus*. Munro, J. A. 1918. *Athene* [*Carine*] *noctua*. Collinge, W. E. 1922b, c; McAtee, W. L. 1922b. *Bubo v. virginianus*. Errington, P. L. 1932. *Buteo swainsoni*. Criddle, N. 1915. Caprimulginae. van Rossem, A. J. 1927. *Carpodacus p. purpureus*. Chapman, F. M. 1896b. *Ceryle* [*Megaceryle*] *alcyon*. Abbott, C. C. 1873. *Chrysococcyx lucidus*. Grimmitt, R. E. 1922; Smith, W. W. 1923. *Colaptes auratus*. Brewster, W. 1893. Corvidae. Collinge, W. E. 1930. *Corvus*. Drieberg, C. 1907; Sprenger, A. 1908. *Corvus americanus* [*brachyrhynchos*]. Judd, S. D. 1896; Nauman, C. H. 1868. *Corvus corniz*. Collinge, W. E. 1930; Staes, G. 1901. *Corvus frugilegus*. Collinge, W. E. 1910. *Crex crex*. Collinge, W. E. 1931. *Cyanocitta*. Dyche, L. L. 1908. Cygninae. Beebe, C. W. 1906e. *Den- dragapus*. Fisher, W. H. 1888b. *Dendroica c. caerulescens*. Harding, K. C. 1931. *Dichoceros bicornis*. Wood, W. S. 1927. *Euphagus cyanocephalus*. Soriano, P. S. 1931. *Falco p. peregrinus*. Carr, R. 1849; Winkler, H. 1908. *Falco subbuteo*. Csörgey, T. 1902. *Fregata minor*. Hedley, C. 1926. Fringillidae. McAtee, W. L. 1908a. *Fulica*. Ever-

- mann, B. W. 1902. *Gallinago*. Gault, B. T. 1902. *Gypagus*. Funck, N. 1916. *Haematopus*. Dewar, J. M. 1913. *Hirundinidae*. Beal, F. E. 1913. *Icterus*. Beal, F. E. 1895a. *Ixoreus*. Law, J. E. 1921. *Lanius*. Esterly, C. O. 1917; Miller, A. H. 1931. *Larus*. Clarke, W. J. 1912; Fisher, W. K. 1907; Wales, J. H. 1926; Ward, F. 1913. *Larus argentatus smithsonianus*. Mackay, G. H. 1892a; Strong, R. M. 1914. *Larus r. ridibundus*. Haviland, M. D. 1915a. *Loxia*. Fisher, W. H. 1888a; Robbins, C. A. 1932. *Melanerpes erythrocephalus*. Aldrich, C. 1879a; Hay, O. P. 1887. *Melopelia asiatica*. Wetmore, A. 1920f. *Merops*. Waite, E. R. 1919. *Nestor notabilis*. Oliver, W. R. 1930; Potts, T. H. 1881. *Oreoscoptes montanus*. Kennedy, C. H. 1911b. *Passer*. Judd, S. D. 1896. *Passerella iliaca*. Linsdale, J. M. 1928c. *Pedioecetes phasianellus campestris*. Lincoln, F. C. 1923. *Pelecanus*. Goss, N. S. 1888. *Penthestes*. Beal, F. E. 1899b. *Perdix perdix*. Lósy, J. 1903. *Phalaropus lobatus*. Pike, O. G. 1915. *Phasianus*. Burnett, W. L. & Maxon, A. C. 1921. *Picidae*. Trouvelot, B. 1925. *Picus*. Gloger, C. W. 1855. *Puffinus opisthomelas*. Anthony, A. W. 1896a. *Raptores*. Errington, P. L. 1933. *Ramphastos*. Stevens, R. P. 1870. *Rhynchops nigra*. Arthur, S. C. 1921. *Seiurus aurocapillus*. Nice, M. M. 1931d. *Sitta*. Averill, C. K. 1888. *Spatula clypeata*. McAtee, W. L. 1922e. *Speotyto*. Errington, P. L. & Bennett, L. J. 1935. *Spizella passerina*. Beal, F. E. 1899b. Weed, C. M. 1899. *Stercorarius parasiticus*. Momiyama, T. 1921. *Sterna f. fuscata*. Watson, J. B. 1908. *Strigidae*. Dunlop, G. A. 1910; Farley, J. A. 1924; Montgomery, T. H. 1899. *Struthio*. Sternberg, W. 1908. *Sturnella*. Beal, F. E. 1895a, 1913. *Sturnus vulgaris*. Kalmbach, E. R. 1922; Lewis, H. F. 1927b. *Totanus*. Kirkover, H. D. 1898. *Toxostoma r. redivivum*. Grinnell, J. 1917b. *Tringa alpina*. Dewar, J. M. 1909b. *Trochilus [Archilochus] colubris*. Eames, E. H. 1890. *Turdidae*. Beal, F. E. 1915a, b. *Turdus m. merula*. Collinge, W. E. 1924; Meiklejohn, A. H. 1906. *Tyrannus tyrannus*. Barrows, W. B. 1894. *Tyto*. Foster, G. L. 1927. *Uraeginthus*. Decoux, A. 1915. *Vireoninae*. Chapin, E. A. 1925. *Vultur [Cathartes] aura*. Hunter, P. 1833; Waterton, C. 1933c, e. *Vulturinae*. Reiser, O. 1911; Sprenger, A. 1908.
- Atropa belladonna* not eaten. S., W. G. 1898.
- Boring holes in trees. *Picidae*. Smith, J. B. 1894.
- Cannibalism. Sunkel, W. 1914. Includes *Falco*. Finn, F. 1899a. *Quiscalus*. Weber, J. A. 1912. *Strigidae*. Richardson, C. H. 1906. *Strix*. Daggett, F. S. 1913. Young in captivity. *Larus*. Rendahl, H. 1913b.
- Captivity feeding. *Dendragapus*. Bishop, W. L. 1912.
- Carrying food adhering to plumage. McAtee, W. L. 1914a.
- Coloration and mimicry relations. Includes birds. Mottram, J. C. 1918.
- Comparison of feeding habits in British Isles and North America. *Sturnus vulgaris*. Kalmbach, E. R. 1922.
- Dividing fish with beak. *Ceryle [Megaceryle]*. Breed, E. E. 1873.
- Diving for food. *Butorides*. Brooks, W. S. 1923.
- Experiments with insects supposed to be offensive. All eaten by some species. Butler, A. G. 1889b.
- Farm, forest, and garden birds compared. Beal, F. E. & McAtee, W. L. 1912.
- Feet used in carrying food. *Corvus*. Fewkes, J. W. 1884.
- Finding food by sight, not by smell. *Vultur [Cathartes] aura*. Waterton, C. 1833c.
- Flower-frequenting birds. Loew, E. 1907. *Nectariniidae*. Werth, E. 1900.
- Foliage-eating. *Spinus p. pinus*. Bassett, F. N. 1923.
- Honey-eating. *Nectariniidae*. Porsch, O. 1924a, b, 1926.
- Impaling instinct. *Lanius*. Watson, J. R. 1910; Whyte, J. 1887.
- Need of more food by small birds because of greater temperature radiation. Lapicque, L. 1911.
- Pollination of flowers. *Archilochus*. Pickens, A. L. 1927. *Nectariniidae*. Schouteden-Wery, J. 1925.
- "Rapid peering"—intense activity in searching for food. Grinnell, J. 1921a.
- Reactions to poisonous plants. Mansion, A. 1901.

Relation to environment in feeding habits. *Haematopus*. Dewar, J. M. 1915a.

Robbing other birds of food. Laridae. Anthony, A. W. 1906.

Strange objects swallowed by various Ratitae. Anderson, R. J. 1912.

Swallowing potato. *Columba p. palumbus*. Marriage, A. W. 1914.

Temperature effects. Many species. Stevenson, J. 1933.

Time of feeding. Many species. Stevenson, J. 1933.

Tongue function. *Trochilus*. Ballou, W. H. 1879.

Use of gravel or sand. Jacobi, A. 1900; Jaekel, H. 1925.

Variation. Snell, F. H. 1861b.

Voraciousness. *Chordeiles popetue*. Harvey, F. L. 1880. *Cuculus*. Freyberg, B. 1872. *Diomedidae*. Belding, L. 1902.

Winter feeding habits. Gabrielson, I. N. 1924a.

Carnivorous habits

Feeding on brain of other species, piercing skull after hypnotizing bird. *Glaucidium nanum*. Machon, F. 1926.

Robbing nests of other birds. Laridae. Anthony, A. W. 1906. *Pica*. Raspail, X. 1909c.

VARIOUS ANIMALS KILLED

Full-grown rabbits by *Pica*. Thompson, G. W. 1926.

Woodrat by *Geococcyx*. Anthony, A. W. 1896b.

Fishes

General. *Ardea c. cinerea*. Heller, F. 1908. *Rhynchops n. nigra*. Stone, W. 1921. *Seiurus motacilla*. Hix, G. E. 1916.

Are dead fish eaten by *Pandion haliaetus carolinensis*? "Roamer" 1877a, b.

Peculiar mode of fishing. *Larus*. Hamilton, E. 1896.

Insects

General. Mailliard, J. 1919a. *Alauda alpestris*. Le Baron, W. 1870. *Calypte anna*. Bassett, F. N. 1920. *Larus ridibundus*. Brown, W. 1844. *Passer*.

Riley, C. V. 1889. *Sterna*. Hald, H. A. 1925.

Various insects eaten

Bees. Glaser, L. 1883.

Butterflies. Esben-Petersen, P. and others 1922; Finn, F. 1899-1900, 1902a, 1907; Fortescue, W. I. 1902; Fox, H. 1899; Frings, C. 1900; Fryer, J. C. 1913a, b; Hilse, C. 1901; Kennel, J. 1898; Latter, O. H. 1902a; McKay, A. E. 1902a, b; Veley, L. J. 1902a, b.

Cicada (17-year). By Laridae. Forbush, E. H. 1924.

Flying insects. By *Melanerpes*. McGregor, R. C. 1900c. By *Sturnus vulgaris*. Schuster, L. 1908.

Grasshoppers. By *Melanerpes erythrocephalus*. Aldrich, C. 1878, 1879a.

Hairy caterpillars. Kingston, A. G. 1892a; Miller, M. M. 1899.

Mosquitoes. By *Chordeiles*. Jennings, A. H. 1908.

Moths. Finn, F. 1902a; McKay, A. E. 1902a, b; Veley, L. J. 1902a, b. By *Troglodytidae*. Aldrich, C. 1879b.

Termites. By *Passer*, *Sialia*, & *Turdus*. Hagen, H. A. 1882.

Trout fly. By *Passeres*. Bergtold, W. H. 1926c.

Wasps. Hesse, E. 1916b.

Fish-eating birds eating insects. Torka, V. 1908.

Insects supposedly protectively colored or bad-tasting often devoured by birds. Judd, S. D. 1899b.

Relation between color and edibility of Lepidoptera and their larvae. Weir, J. J. 1869, 1870.

Warning and confusing color effects. Krause, A. H. 1911.

Mollusks

General. *Corvus c. cornix*. Michel, J. 1891.

Eating *Mytilus*. *Haematopus*. Dewar, J. M. 1908b.

Other birds

General. By *Antrostomus carolinensis*. Stone, W. 1898a.

Asio f. flammeus. Munro, J. A. 1918.

Falco sparverius attacking *Turdus*. Mailliard, J. 1924.

Young birds

Anatidae. By *Melanerpes erythrocephalus*. Aldrich, C. 1877b.

Phasianus. By *Quiscalus*. Foster, F. B. 1927.

Spinus t. tristis. By *Euphagus cyanocephalus*. Anthony, A. W. 1923.

Sheep-killing

See also under **Economic ornithology**.

Nestor notabilis. Book. Text in English. Marriner, G. R. 1909; Oliver, W. R. 1930.

General. *Nestor notabilis*. Benham, W. B. 1906a, 1907; Marriner, G. R. 1907, 1908; Potts, T. H. 1881; Wharton, H. T. 1880; White, T. 1894, 1895.

Origin of sheep-killing habit. *Nestor*. Haacke, W. 1896a.

Changes in feeding habits

General. *Buphaga*. Hinde, S. L. 1900a; Lankester, E. R. 1900. Picidae. Calvin, S. 1877.

Destructive. *Gyps* & *Psittacus*. Evans, M. S. 1895a.

Feeding effects on beak. *Colaptes auratus*. Sharp, B. 1889.

Replacement of one habit by another. Many species. Schut, L. W. 1921.

Destruction of eggs

General. *Cuculus*. Gurney, J. H. Jr. 1897a; Humphreys, G. R. 1926. *Troglodytes a. aëdon*. Creaser, C. W. 1925.

Destroying eggs of *Colinus*. *Passer*. Bowles, E. D. 1886.

Disgorgement

See also under **Food**.

General. Proctor, T. 1897.

Cherry stones. Baily, W. L. 1897.

Poisonous seeds. Lowe, J. 1898.

Feather-eating

General. *Podiceps*. Madon, P. 1926b. Psittaci. Schaff, E. A. 1902; Schmidt, M. 1864.

Feathers eaten forming a pyloric plug which aids in digestion by acting

as sieve. *Aechmophorus*, *Anhinga*, *Colymbus*, & *Podilymbus*. Wetmore, A. 1920g.

Fruit eaten

General. *Ceryle* [*Megaceryle*]. Coues, E. B. 1878a. *Oreoscoptes montanus*. Kennedy, C. H. 1911b.

Bayberries. Hirundinidae. Allinson, J. 1879.

Juice of unripe grapes. Compositulipidae. McAtee, W. L. 1904.

Opening shells of bivalve mollusks

Beak used. *Haematopus*. Dewar, J. M. 1922.

Breaking shells by dropping from considerable heights. *Corvus*. Loos, C. 1891. Laridae. Anthony, A. W. 1906; Oldham, C. 1930.

Opening mollusk shells by dropping them from great heights. *Larus*. Engle, R. F. 1915; Legge, W. V. 1866.

Sap-drinking

General. *Dendroica*. Mousley, W. H. 1917b. Picidae. Lehmann, E. 1926; Osmaston, A. E. 1916. *Sphyrapicus v. varius*. Mousley, W. H. 1917b.

Factors determining location of borings. *Sphyrapicus v. varius*. Taggart, M. W. 1912.

Good illustration of holes made in trees. *Sphyrapicus v. varius*. Horsford, B. 1884.

Hummingbirds sucking sap from sap-sucker holes. Bolles, F. 1891.

Storing food

Usually in holes in trees.

Acorns. *Dendropicus major*. Selous, E. 1908b. *Melanerpes* [*Balanosphyra*] *formicivorus bairdi*. Fisher, W. K. 1906; Michael, C. W. 1926; Murray, A. 1855; Ritter, W. E. 1921, 1922; Selous, E. 1908b; Stearns, R. E. 1882a.

Almonds. *Melanerpes* [*Balanosphyra*] *formicivorus*. Gignoux, C. 1921b.

Unusual feeding habits

General. *Turdus pilaris*. Lönnerberg, E. 1929c.

Eating corn. *Larus*. Connell, C. G. 1926.

Shelled corn. *Melanerpes erythrocephalus*. Aldrich, C. 1879a.

FLYING HABITS

See also under **Locomotion**.

General. Clark, A. H. 1925; Dewitz, J. 1901; Nauwerck, W. 1894; Nietsch, V. 1905; *Olshausen, A. 1908; Rich, W. H. 1929; Webster, G. V. 1918.

Archilochus alexandri. Woodbury, A. M. 1930a. *Ectopistes*. Greenleaf, P. H. 1855. *Fulmarus*. Anthony, A. W. 1895b. *Pelecanus*. Roulin, F. D. 1826. Flightless birds. Fitz-Simons, F. W. 1907.

Diurnal flying habits when feeding young. *Strix*. Dunlop, E. B. 1911a.

Eating in flight. Reichenow, A. 1895.

Flight habits in high gales. Anon. 1891a.

Manner of holding prey. Carnivorous birds. Nauwerck, W. 1894, 1895.

Night soaring. *Cypselus*. Edwards, A. 1914; Kingston, A. G. 1892a. Flying in evening. *Hirundinidae*. Kingston, A. G. 1892a.

NOCTURNAL HABITS

General. Huey, L. M. 1927b; Mattingley, A. H. 1908c.

Includes birds. Hardy, C. C. 1863.

Dumetella carolinensis. Stevenson, A. 1893. *Laridae*. Schuster, W. 1906b. *Larus argentatus*. Lucas, F. A. 1892a. *Turdus iliacus*. Booth, H. B. 1911; Stubbs, F. J. 1911b.

Brooding birds and nestling birds. Haviland, M. D. 1914b.

Flying. Mathew, G. F. 1871.

Roosting in colony. *Quiscalus*. Jones, L. 1897.

Singing at night. Eaton, A. A. 1893a; Edson, J. M. 1893; Fisher, M. L. 1921; Fleming, W. W. 1886; Gibbs, R. M. 1892c. *Alauda a. arvensis*. Laws, M. A. 1892. *Ammodramus* & *Calcarius*. Jones, L. 1893a. *Coccyzus*. Lewis, J. B. 1893. *Cyanospiza*. Ridgway, R. 1892a. *Icteria*. Lewis, J. B. 1893; Ridgway, R. 1892a. *Mimus*. Ridgway, R. 1892a. *Nannus h. hiemalis*. Rhoads, S. N. 1895. *Seiurus*. Lewis, J. B. 1893; Ridgway, R. 1892a. *Spiza*. Jones, L. 1893a. *Spizella*. Ridgway,

R. 1892a. *Telmatodytes p. palustris*. Hunt, C. J. 1904b. *Turdus*. Ellison, A. 1894; Jones, L. 1893a.

POSTURE

See also under **Locomotion**.

General. *Tetrao*. Loewis, O. 1881b. Attitudes on land. *Colymbus* & *Gavia*. Shufeldt, R. W. 1898c.

Carriage of tail. *Galloperdix*. Finn, F. 1899d.

Changes at various hours of day. *Nyctibius jamaicensis*. Goeldi, E. A. 1904.

Flight posture

Book. Text in English. Pycraft, W. P. 1922.

Position of legs in flight. See also under **Locomotion**. Voigt, A. 1894b.

FOOT POSITION

General. Floericke, C. E. 1895.

Feet carried close to body in cold weather. *Laridae*. Anthony, A. W. 1906.

SINGING HABITS

See also under **Behavior** and **Sound production**.

Books. Text in English. Evans, W. E. 1851; Howard, H. E. 1920; Jennings, J. 1829; Saunders, A. A. 1935.

Text in German. Haecker, V. 1900.

General. Barrington, D. 1773; Dorno, C. 1924; Fabani, C. 1892b; Gibbs, R. M. 1893c; Graeser, K. 1907a; Gröbels, F. 1907; Hagen, W. 1908b; Hampel, W. 1872; Moody, M. B. 1893. Many species. Christoleit, E. 1927b; Wright, H. W. 1912.

Alcedo. Marsden, W. M. 1927. *Cardinalis* [*Richmondina*] *cardinalis*. Nowell, J. R. 1899. *Icterus*. Haldemann, S. S. 1879. *Mimus*. Michener, H. & Michener, J. R. 1935. *Parus*. Haldemann, S. S. 1879. *Tyrannus tyrannus*. Hausman, L. A. 1925.

Crowing of male. *Gallus*. Peal, S. E. 1891a.

Duets. Huxley, J. S. 1919b.

Mocking. See also under **Behavior**. Braun, F. 1910. *Phylloscopus rufus*. Huxley, J. S. 1908; Kelsall, J. E. 1908.

Origin of singing habits. Clark, X. 1879.

Physiology of impulse to sing. Haecker, V. 1916, 1924a.

Significance of singing habits. Headley, F. W. 1909.

Location

General. Gröbbels, F. 1907.

Distance from nest of singing male. Mousley, W. H. 1919.

Flying. Csörgey, T. 1922; Ranson, J. 1864.

On nests. Hales, H. 1894.

Song periods

General. Alexander, C. J. & Alexander, H. G. 1908, 1911; Baerg, W. J. 1930; Burkitt, J. P. 1922; Campbell, D. C. 1921; Godfrey, R. 1897; Saunders, A. A. 1921b.

Duration and intensity of song period. Pupovac, O. 1915.

Early morning. Gygell, W. 1903; Zimmer, C. 1919. Many species. Wright, H. W. 1912.

Evening. Many species. Wright, H. W. 1912.

Late evening. Gygell, W. 1903.

Mid-day. Ridgway, R. 1892a.

SINGING OUTSIDE OF BREEDING SEASON

General. Braun, F. 1908b, 1910; Schürer, J. 1906; Wood, N. 1837.

August. Hyatt, M. 1893.

Autumn. *Alauda arvensis*. Gardiner, W. 1835. *Phylloscopus rufus*. Meiklejohn, A. H. 1901; Townsend, G. 1901; Warner, W. H. 1901.

October. *Alauda arvensis*. Wilson, W. 1899.

Seasonal decline. Fry, H. J. 1916; Helms, O. 1910.

Winter and on migration. Alexander, C. J. 1917b.

VARIOUS FACTORS

Breeding period. Burkitt, J. P. 1919.

Light. *Troglodytes a. aëdon*. Lutz, F. E. 1931.

Relation to sexual selection and sex hormones. Hawkins, C. J. 1918, 1920.

Weather

General. Alford, C. E. 1925; Harvie-Brown, J. A. 1899b; Raspail, X. 1907a; Schwan, A. 1921.

Temperature. *Mimus p. polyglottos*. Shaver, J. M. & Walker, G. 1930.

HEAD

See also under Alimentary canal, Brain, Eye, Ear, Integument, Nervous system, Olfactory organs, and Skull. This section includes publications that are not easily referred to various organs.

Anatomy and morphology. Bittner, H. 1925b. Includes birds. Goodsir, J. 1857. Birds incidental. Jäger, G. 1862-63. Book. Text in Latin. Klein, J. T. 1759. Blood-sucking birds. Moller, W. 1931. Crested fowls. *Gallus*. Neumann, F. 1914. *Meleagris*. Petit, F. 1738. *Ramphastos loco*. Gould, J. 1833-35.

General dissection view. Book. Text in German. Vogt, C. & Yung, E. 1889-94.

Good figures of median sagittal sections. Göppert, E. 1903.

Dissection including ear and skull figured. *Tetrao urogallus*. Graff, L. 1885.

Lateral line system. Transitory in embryo. Meek, A. 1907.

Palate. Includes birds. Fleischmann, A. 1910.

Parietal eye. Development. *Columba* & *Gallus*. Livini, F. 1905a, b.

Periorbital region. Structure. *Anser*, *Corvus*, *Gallus*, & *Meleagris*. Barkard, O. 1902.

Development

Book. Text in German. Includes birds. Dursy, E. 1869.

General. Birds incidental. Jäger, G. 1862-63. *Anas*. Kupffer, C. W. 1893; *Rex, H. 1897. Include *Gallus*. *Froriep, A. 1894; His, W. 1892a; Kupffer, C. W. 1893; Locy, W. A. 1895a. *Larus*. *Rex, H. 1901a, 1905, 1911. Crested fowl. *Gallus*. Neumann, F. 1914.

Metamerism. Goronovitsch, N. 1892. Includes *Gallus*. Zimmermann, K. W.

1891. Include *Larus fuscus*. Meek, A. 1907, 1912.

BEAK

General. Duhamel du Morceau, H. L. 1755. *Diomedea*. Loomis, L. M. 1919b. *Opisthocomus*. Deville, E. 1852. *Plautus impennis*. Preyer, W. T. 1862.

Comparison of curvature of beak and claws. Rapacious birds. Scrofani, P. 1899.

Correlation in beak form with habitat. Gengler, J. 1911.

Irregular denticulation. MacGillivray, W. 1832.

Jaw mechanism. Includes birds. Teutleben, F. E. 1874.

Nestling beak. *Psephotus*. Pycraft, W. P. 1907d.

Periodic changes in form. *Sturnus vulgaris*. Rosenbach, O. 1902.

Relation in size and shape to food. No correlation. *Geospiza*. Snodgrass, R. E. 1902.

Anatomy

General. *Hesse, E. 1907b, 1913a. Includes *Gallus*. Albrecht, P. C. 1885. *Loxia*. Yarrell, W. 1829. *Scolopax*. Clara, M. 1925.

Histology. *Gallus*. Cuccati, G. 1889. *Platalea*. Jobert, C. 1873c.

Internal structure. *Ramphastos toco*. Owen, R. 1834a.

Taxonomic anatomy. Procellariiformes. Hombrohn, J. B. & Jacquinot, C. H. 1844.

Vascularity of beak. *Ramphastos*. Traill, T. S. 1815.

Development

General. His, W. 1885. Birds incidental. Keibel, F. 1893. *Ardea cinerea*. Sushkin, P. P. 1912. *Cranorhinus*. Walden, A. 1874. *Dryocopus*. Loos, C. 1911b. *Eudypetes chrysocome*. *Lewin, M. 1903. *Gallus*. Gardiner, E. G. 1884; *Rosenstadt, E. B. 1902, 1912. *Melopsittacus*. Gardiner, E. G. 1884; *Ghigi, A. 1902. *Picus*. Heusinger, K. F. 1812. *Vanelus*. Graul, W. 1907.

Crested fowl. *Gallus*. Neumann, F. 1914.

GROWTH

General. Kohn, A. 1877.

Changes in form. *Diomedea brachyura*. Shufeldt, R. W. 1885d.

Metamorphosis of beak. Pici. Heusinger, K. F. 1812.

HISTOGENESIS

General. *Gallus*. Cuccati, G. 1889.

Epidermal portion of beak. Jeffries, J. A. 1888. *Gallus*. Remak, R. 1848.

Mesodermal papillae on mouth border. *Melopsittacus*. Keibel, F. 1901b.

Horny sheath

General. Boetticher, H. 1928.

Epidermal fibrillae. Histogenesis. Role of chondrosomes (Mitochondria). *Gallus*. Firket, J. 1911.

Morphology. Doenitz, F. C. 1869b.

Rhamphotheca. Homologies of elements. Many species. *Lönningberg, A. J. 1904a.

Crest present in both sexes

General. *Pelecanus*. Snow, F. H. 1875.

Deciduous nature. *Pelecanus*. Baird, S. F. 1869.

Two small transitory knobs at base of upper mandible in spring. *Oedicnemus*. Gurney, J. H. Jr. 1889d.

Lower mandible

General. Many species. Lebedinsky, N. G. 1921a.

Development. Many species. *Lebedinsky, N. G. 1920. *Larus*. Rex, H. 1911.

Mandibular pouch. *Pelecanus*. Duvernoy, G. L. 1835b.

Supposed pouch under beak. Does not exist. *Corvus frugilegus*. Waterton, C. 1832d.

FORM

Environmental effects. Many species. *Lebedinsky, N. G. 1918b, 1921a.

Feeding habits, effects. Many species. Lebedinsky, N. G. 1918a.

Mobility of upper mandible

General. Many species. Nitzsch, C. L. 1816, 1817; Wilbrand, J. B. 1823. *Gallinago*. Trowbridge, C. C. 1894. *Limosa haemastica*. Trowbridge, C. C. 1894; Trowbridge, W. P. 1891. *Philohela*. Trowbridge, C. C. 1894. *Scolopax*. Beckmann, L. 1865. *Tringa*. Pycraft, W. P. 1893b.

Entotympanic muscle. *Gallinago*. Workman, W. H. 1907b.

Fronto-nasal joint. *Cygnus*. Boyes, F. & Boulton, W. W. 1871.

Physiology

Function. Grote, H. 1902; Schwartz, M. 1908; Snell, S. H. 1904. *Dryocopus*. Loos, C. 1911b. *Ramphastos brevicaarinatus*. Van Tyne, J. 1929.

Male sex hormone effect on color. *Larus ridibundus*. van Oordt, G. J. & Junge, G. C. 1930.

Movements of beak. Many species. Hérisant, F. D. 1752.

Use of beak as sieve or filter. *Spatula*. Zander, E. 1908.

Soft mouth parts

General. Ploceidae. Chapin, J. P. 1917.

Luminous papillae of nestlings. Kiltermann, —. 1905; Lewek, T. 1901. Ploceidae. Rey, J. G. 1901. *Poephila*. Brandes, G. 1901; Butler, A. G. 1898b; Chun, C. 1902, 1903; Knauer, F. K. 1904; Stenta, M. 1905.

Ornamentation. *Ortygospiza polyzona*. St. Quintin, W. H. 1910.

Roof of mouth. Includes birds. Sippel, W. 1908.

NASAL REGION

Structure and development. Dieu-lafé, L. 1904. Includes *Anas* & *Gallus*. *Beecker, A. 1903.

Nasal chamber

Anatomy. Schultze, M. 1862. Many species. Hoffmann, B. 1882; *Ishihara, K. 1932; Parker, W. K. 1875, 1877, 1879b; Strong, R. M. 1911b; *Technau, G. 1936. *Apteryx*. Parker, T. J. 1888. *Gallus*. Mihákovics, G. V. 1898. *Microglossa alecto*. Parker, W. K. 1865a. *Phalacrocorax*. Pycraft, W. P. 1899b. *Ramphastos toco*. Owen, R.

1834a. *Speotyto cunicularia hypogaea*. Shufeldt, R. W. 1881g.

Glands. Book. Text in German. Birds, pp. 42–48. Schultze, M. 1862.

Nasal and paranasal chambers. Good drawings. Bittner, H. 1925b.

Development

General. Many species. Parker, W. K. 1879b. *Gallinula chloropus*. Willink, H. D. 1899b. Include *Gallus*. Born, G. 1879; Kölliker, R. A. 1860.

Vestibule. *Gallus*. Branca, A. 1908.

CONCHAE OR TURBINATES

General. Mihákovics, G. V. 1896. Many species. Nitzsch, C. L. & Giebel, C. G. 1876; Technau, G. 1936. Birds incidental. Ingersoll, J. M. 1908. *Aegithognathous* birds. Parker, W. K. 1877. Includes *Anas*. Beecker, A. 1903. *Apteryx*. Parker, T. J. 1888. *Caprimulgus*, *Columba*, & *Corvus*. Gegenbaur, C. 1873. *Gallus*. Beecker, A. 1903; Gegenbaur, C. 1873; Mihákovics, G. V. 1898. *Gypoggeranus*. Gegenbaur, C. 1873. *Meleagris*. Harwood, B. K. 1796. *Microglossa alecto*. Parker, W. K. 1865a. *Numenius*. Gegenbaur, C. 1873. *Passeriformes*. Giebel, C. G. 1876. *Pici*. Shufeldt, R. W. 1900b. *Podargus*, *Psittacus*, & *Raptores*. Gegenbaur, C. 1873. *Speotyto cunicularia hypogaea*. Shufeldt, R. W. 1881g.

Development. Includes *Gallus*. Kölliker, R. A. 1860.

Homologies. Birds incidental. Peter, K. 1902.

JACOBSON'S ORGAN

Rudimentary in embryo only. Includes birds. Zuckerkandl, E. 1910. *Gallus*. Cohn, F. 1903; Mihákovics, G. V. 1896, 1898.

Development. *Gallinula chloropus*. Willink, H. D. 1899b.

Medial portion of nasal gland ducts a reduced Jacobson's organ. Ganin, M. S. 1890.

NASOLACRIMAL DUCT

General. Many species. Technau, G. 1936. *Anas*, *Buceros*, *Buteo*, *Gallus*, & *Psittacus*. *Hoffmann, B. 1882.

Development. *Gallus* incidental. Born, G. 1877, 1879. *Pygoscelis*. *Ask, F. 1913.

Nostrils

Position. Includes birds. Negus, V. E. 1925.

ABSENCE

General. *Pelecanus* [Moris] *bassanus*. Montagu, G. 1810. *Sula*. Schlegel, H. 1839.

OBLITERATION

General. *Phalacrocorax*. Ewart, J. C. 1882; Pycraft, W. P. 1899b.

Nostrils present in newly hatched cormorants. Closure about time young take to water and feed themselves. *Phalacrocorax*. Anthony, A. W. 1897b; Lucas, F. A. 1897b.

HEARING

See also under Ear.

General. Adams, A. L. 1877; Fabani, C. 1895b; Hussey, R. F. 1917. *Columba*. *Breuer, J. 1907; Tjumjanzeff, N. F. 1931. Includes *Falco*. Breschet, G. 1833. *Gallus*. Breuer, J. 1907; *Goebel, O. 1913; Katz, D. & Révész, G. 1921; Kline, L. W. 1899; Schmid, B. 1912. *Larus argentatus*. Strong, R. M. 1914. *Meleagris*. Caton, J. D. 1870. *Spinus*. *Breuer, J. 1907.

Decerebrate bird. *Columba* & *Gallus*. Schrader, M. E. 1891.

Embryos. Gloger, C. W. 1856e, 1860a.

Young birds. *Gallus*. Thorndike, E. L. 1899.

PHYSIOLOGY OF HEARING

General. *Anas*, *Anser*, *Columba*, *Gallus*, *Passer*, & *Serinus*. Wada, Y. 1924.

Deafness of male uttering loud note in sexual excitement. Erectile tissue in wall of external auditory meatus swells as result of increased blood pressure and, along with pressure from the contracting M. depressor mandibulae closes the passage, bird becoming deaf to outside world. *Tetrao u. urogallus*. Ehrlich, H. 1907; Gadow, H. F. 1891d; Graff, L. 1885; Olt, J. 1907a, b; Oppel, L. 1912; Wurm, W. 1885, 1904.

Fright from loud noise. *Hirundinidae*. Midgley, T. 1896.

Function of elastic ligaments in middle ear. *Gallus*. Pohlman, A. G. 1921b.

Perception of sounds of different pitch and timbre. *Chrysotis*. Lashley, K. S. 1913.

Recognition of sound location. Mailiard, J. 1922; Pohlman, A. G. 1921a.

Sound effects upon respiratory movements. *Columba*. Rouse, J. E. 1905.

Experimental studies

General. *Columba*. Jellinek, A. 1926.

Electrical apparatus tests. Frequencies 100 to 10,000 heard. *Columba*. Wever, E. G. & Bray, C. W. 1936.

Experimental removal of labyrinths. *Columba*. Ewald, J. R. 1895; Wundt, W. M. 1894.

HEART

Books. Text in English. Owen, R. 1866-68.

Text in German. Tigerstedt, R. A. 1921-23; Vogt, C. C. & Yung, E. 1888-94.

General. Many species. Parrot, C. P. 1893. Includes birds. Sabatier, C. P. 1873a. *Anas* & *Anser*. Lorenz, H. 1921. *Apteryx*. Beddard, F. E. 1885c; Lankester, E. R. 1885a, b; Owen, R. 1885. *Balearica pavonina*. Méry, J. 1733b. *Cochleariidae*. Murie, J. 1872b. *Columba*. Barge, J. A. 1914; Lorenz, H. 1921; McKenzie, I. 1910b. *Dromaeus* [*Dromiceius*]. Coughtrey, M. 1873a. *Eurypygidae*. Murie, J. 1872b. *Gallus*. *Kern, A. 1926; Lorenz, H. 1921. *Nucifraga*, *Oidemia*, & *Olygyps*. Barge, J. A. 1914. *Rhinocetidae*. Murie, J. 1872b. *Sarcophamphus*. Beddard, F. E. 1890a, 1902c. *Struthio*. Lorenz, H. 1921. *Tinnunculus*. Barge, J. A. 1914.

Melanotic pigmentation. *Gallus*. Stiefel, K. 1926.

ANATOMY

Book. Text in French. Includes birds. Sabatier, C. P. 1873b.

General. Many species. Röse, C. 1890. Include birds. *Gasch, F. R. 1888; Gegenbaur, C. 1866. *Anser*. Röse, C. 1890. *Columba*. Röse, C. 1890; Vogelsang, C. 1840. *Corvus*. Röse, C. 1890. *Emberiza* & *Fringilla*. Vogelsang, C. 1840. *Gallus*. Stiefel, K.

1926; Vogelsang, C. 1840. *Rhea*. Röse, C. 1890. *Strix*. Vogelsang, C. 1840.

Coronary arteries. Petré, T. 1926.

Functional ductus arteriosus (Botalli). *Dafila* & *Nycticorax*. Finn, F. 1891a.

Left ventricle. Carapezza, L. 1898.

Muscular architecture. *Gallus*. Shaner, R. F. 1923.

Pericardium. *Columba*, *Nucifraga*, *Oidemia*, *Olygyps*, & *Tinnunculus*. Barge, J. A. 1914.

Thebesian veins and sinusoids. *Gallus*. Uchiyama, T. 1928.

Topographic relations. Includes *Gallus*. Fleischmann, A. 1924.

Atrioventricular system (Bundle of His)

General. Ohmori, S. 1928. *Anas*. Mangold, E. 1914b. *Chenopsis atrata*. *Davies, F. 1930. *Chloris*. Keith, A. & Flack, M. 1907. *Ciconia*. *Davies, F. 1930. *Columba*. *Davies, F. 1930; Külbs, F. 1912. *Gallus*. Mangold, E. 1914b; *Mangold, E. & Toyojiro, K. 1914a, b; Okata, Y. 1928; Shindo, T. 1927. Includes *Gallus*. Külbs, F. 1912. *Passer*. Keith, A. & Flack, M. 1907. *Struthio*. *Davies, F. 1930; Drennan, M. R. 1927.

Atrioventricular bundle and sinoauricular node described as absent. McKenzie, I. 1910a, b; McKenzie, I. & Robertson, J. I. 1910.

Lack of typical node tissue. *Anas*, *Anser*, & *Gallus*. Mangold, E. & Toyojiro, K. 1914a.

PURKINJE FIBERS

Development. *Columba*. Frank, A. 1927. *Gallus*. Külbs, F. 1920.

Histology. Many species. Holmes, A. H. 1923. *Columba*, *Corvus* & *Strigidae*. Tang, E. H. 1922.

Histology of myocardium

General. *Fringilla*. Schockaert, A. 1909. *Gallus*. Schockaert, A. 1909; Stiefel, K. 1926. *Passer*. Schockaert, A. 1909.

Elastic tissue. Distribution. *Gallus*. Rizzo, A. 1901.

CARDIAC MUSCLE FIBERS

Arrangement in ventricles. Includes birds. Pettigrew, J. B. 1864a.

Cytology. *Anas*, *Columba*, *Gallus*, & *Meleagris*. Kato, Y. 1928. *Trochilus*. *Jordan, H. E. 1911.

Innervation of heart

General. Budge, J. 1860; Hosi, T. 1926; *Kahn, R. H. 1915. Birds incidental. His, W., Jr. & Romberg, —. 1890; Wagner, R. 1854. *Anas*. Paton, D. N. 1912; Ssinelnikow, R. 1928. *Anser*. Ssinelnikow, R. 1928. *Columba*. Kasahara, I. 1928; Ssinelnikow, R. 1928. *Corvus* & *Gallus*. Ssinelnikow, R. 1928.

Development. His, W. Jr. 1893.

Taxonomic consideration. Kondratjew, N. S. 1926.

GANGLIA

General. *Astur*, *Corvus*, & *Pica*. Pisskunoff, N. N. 1911.

Arrangement. *Columba*, *Corvus*, *Falco*, *Gallus*, *Muscicapa*, & *Passer*. Schklarowski, A. 1872b.

Ganglion cells in walls of ventricles. Includes *Anas*, *Gallus*, & *Meleagris*. Kasem-Beck, A. 1887.

Valves

General. Includes birds. Pettigrew, J. B. 1866. *Anas*. *Oehl, S. C. 1859. *Dromiceius*. Piaz, A. M. 1911b. *Gallus*. *Oehl, S. C. 1859. *Struthio*. Piaz, A. M. 1911b.

Cartilage in valves. *Anas* & *Gallus*. *Oehl, S. C. 1859.

Pre-caval homologues. *Dromaeus* [*Dromiceius*] *novae-hollandiae*. Cough-trey, M. 1873a.

ATRIO (AURICULAR) VENTRICULAR VALVES

Development. Includes *Gallus*. Favaro, G. 1912.

Left atrio (auricular) ventricular valves

General. Many species. Hodgkinson, A. 1901.

Valve of right ventricle. Right cardiac valve

General. *Apteryx* & *Gallus*. Lankester, E. R. 1885b.

Arrangement of muscle fibers. McIntosh, W. C. 1862.

DEVELOPMENT

See also under Embryology.

Books. Text in French. *Gallus*. Haller, A. 1758.

Text in Latin. *Gallus*. Haller, A. 1767a; Lancisi, M. G. 1738.

General. Szaniawski, W. 1925. Includes birds. Hasebroek, K. 1917. Birds incidental. Spitzer, A. 1919; Ziegler, H. E. 1915. *Anas*. Gräper, L. 1907; *Weber, A. 1902g. *Anas* incidental. Strahl, H. & Carius, F. 1889. *Anser*. Gräper, L. 1907. *Fringilla*. Schockaert, A. 1909. *Gallus*. Afanasieff, N. 1869; Assaky, G. 1883; Bosio, C. & Midana, A. 1924; Fano, G. 1889; *Gasser, E. 1876, 1877c; Gräper, L. 1907; *Masius, J. 1889; Olivo, O. 1925a, b; *Patten, B. M. 1922; Prévost, J. L. & Dumas, J. B. 1824; Prévost, J. L. & Lebert, H. 1844, 1850; Reichert, C. B. 1837; Schenk, S. L. 1866; Schockaert, A. 1909; Türling, J. 1886. Includes *Gallus*. Spitzer, A. 1921. *Larus*. Gräper, L. 1907. *Passer*. Schockaert, A. 1909. *Vanellus*. *Fuchs, F. 1924. Includes *Vanellus*. Spitzer, A. 1921.

Embryonic duality of heart. *Gallus*. Dareste, C. 1866b, 1877a, 1889b, 1890a.

Heart and great vessels connecting with it. Lindes, G. 1865.

Tissue culture. *Gallus*. Rumianzew, A. 1922, 1927.

Development of parts and tissue

Bulbus cordis. Includes *Gallus*. *Langer, A. 1895.

Cardiac jelly. *Gallus*. Davis, C. L. 1924.

Chorio-allantoic grafts of blastoderm containing heart rudiment. *Gallus*. *Willier, B. H. & Rawles, M. E. 1931a.

Ductus arteriosus absent. *Gallus*. Kern, A. 1926.

Elastic tissue. *Gallus*. Rizzo, A. 1901.

Endocardium. Factors producing thickening. *Gallus*. Chang, C. 1932.

Foramen ovale. Many species. Maggi, L. 1879. *Gallus*. Kern, A. 1926.

Interatrial septum. *Gallus*. Chang, C. 1931a; Patten, B. M. 1925.

Mesentery. *Columba* & *Corvus*. Robert, H. L. 1837.

Muscle. *Gallus*. Chiarugi, G. 1887.

Myocardium at stage of first contractions in embryo. Includes *Gallus*. Bruno, G. 1918.

Myofibrillae. *Gallus*. Levi, G. 1922b; Olivo, O. 1924a.

Pericardium. Includes *Gallus*. Uskov, N. V. 1883.

Septa. *Gallus*. Takahashi, S. 1923.

Sinoatrial region. *Gallus*. Quiring, D. P. 1933.

Tissue culture. *Gallus*. Rumianzew, A. 1922, 1927.

PHYSIOLOGY OF HEART

Books. Text in French. Bernard, C. 1858, vol. 2, p. 394. Includes birds. Sabatier, C. P. 1873b.

General. Murata, T. 1930. Many species. Löer, F. 1911. Birds incidental. Pohlman, A. G. 1914; Ziegler, H. E. 1915. *Anas*. *Kahn, R. H. 1915; Rubbrecht, R. 1898. *Anser*. Rubbrecht, R. 1898. *Columba*. Dogiel, J. 1910; *Kahn, R. H. 1915; Wagner, R. 1860. *Gallus*. *Kahn, R. H. 1915; Steno, D. N. 1673a. *Meleagris*. Rubbrecht, R. 1898.

Temperature effect on metabolism of cardiac muscle. Includes *Columba* & *Gallus*. Hess, W. R. & Ryffel, W. 1923.

Contractions

Rate. Many species. Buchanan, F. 1909, 1911; Stuebel, H. 1910a. Falcons. Sumner, E. L. 1933.

Temperature effects. Includes *Columba* & *Gallus*. Hess, W. R. & Ryffel, W. 1923.

PROPAGATION AND CONDUCTION OF CONTRACTION WAVES

General. *Gallus*. Firket, P. 1912.

Myogenic theory of contraction waves. Includes birds. Lange, W. 1914.

Origin. *Anas*, *Anser*, & *Gallus*. Mangold, E. & Toyojiro, K. 1914a.

Atrioventricular bundle function

General. *Gallus*. *Mangold, E. & Toyojiro, K. 1914b.

Purkinje fibers, function. Many species. Holmes, A. H. 1923.

Electrocardiograph studies

General. *Anas*, *Columba*, & *Gallus*. *Kahn, R. H. 1915; Mangold, E. 1919.

Form of electrocardiogram. Many species. Buchanan, F. 1909.

Wild and tame birds compared. *Anas*. Buchanan, F. 1913.

VAGUS NERVE ACTION

See also under Nervous system.

General. Wagner, R. 1854. *Anser*. *Einbrodt, P. 1859. *Columba*. *Jürgens, H. 1909; Wagner, R. 1860. Includes *Columba*. Knoll, P. 1897. *Gallus*. *Einbrodt, P. 1859.

Drug effects. *Gallus*. Gibbs, O. S. 1926.

Stimulation. Budge, J. 1860.

Embryonic heart

General. *Gallus*. Cesana, G. 1911-12; Fano, A. 1885; Fano, G. & Badano, F. 1890.

CONTRACTIONS

General. *Gallus*. Romanoff, A. L. 1929e.

Abnormal. *Gallus*. Féré, C. 1895l.

Coefficients. *Gallus*. Cesana, G. 1911-12.

Form of electrocardiogram. *Gallus*. Wertheim-Salomonsen, J. K. 1913.

Period of contractions after opening egg. *Gallus*. Gerlach, L. 1886.

Very early observation. *Gallus*. Book. Text in English. Aristotle 1910.

Development

General. *Gallus*. Johnstone, P. N. 1925; Olivo, O. 1924c, 1925c; Patten, B. M. & Kramer, T. C. 1933.

Chronicity. *Columba* & *Gallus*. Olivo, O. 1926.

Fragments in tissue culture

General. *Gallus*. Bucciantie, L. 1927; Cohn, A. E. 1925b; Levaditi, C.

& Mutermilch, S. 1913; Rumianzew, A. 1927.

Synchronous pulsation of two heart fragments. *Gallus*. Fischer, A. 1924b.

Temperature characteristic for contraction rate of isolated fragments. *Gallus*. Murray, H. A. 1926d.

Rate of contraction

General. *Gallus*. Cohn, A. E. 1925a.

Effect of temperature. *Gallus*. Ohara, Y. 1923; Lewis, W. H. 1924.

Temperature characteristic. *Gallus*. Cohn, A. E. 1928.

Rhythm

General. *Gallus*. Lewis, W. H. 1924.

Isolated heart muscle cells. Myogenic origin. *Gallus*. Burrows, M. T. 1912.

Pharmacologic experiments

General. *Gallus*. Cyrillo, L. 1901; Pickering, J. W. 1893.

Effects of calcium and potassium salts on contraction rate of embryonic heart. *Gallus*. Olivo, O. 1924b.

Fibroblasts of embryonic heart. Experimental treatment with hypo- and hypertonic solutions. *Gallus*. Hogue, M. J. 1919.

Stimuli

Differentiation. *Gallus*. Cohn, A. E. 1925b.

Electrical. *Gallus*. Bloch, H. 1888; Johnstone, P. N. 1925. Includes *Gallus*. Pickering, J. W. 1896.

SIZE

Measurements. Bollinger, O. 1894; Loer, F. 1911; Parrot, C. 1893; Piaz, A. M. 1911a.

CORRELATIONS AND RELATIONS OF SIZE TO

Body weight. Includes birds. Grober, J. A. 1913a.

Flight. Blanchard, C. E. 1860a.

Heart weight. Schenkling-Prévôt, C. 1895a.

Load. *Gallus*. Hesse, R. 1908.

Pulse rate compared in wild and tame ducks. Buchanan, F. 1913.

HYPERTROPHY AND DILATION

General. Includes birds. Hasebroek, K. 1917.

High altitude effects. *Anas*. *Strohl, J. 1910d. *Lagopus*. Strohl, J. 1910c, d. *Larus*. *Strohl, J. 1910d.

Long-continued stimuli. *Anas* & *Diomedea*. Grober, J. A. 1913b.

Size relationships in domesticated and wild ducks and gulls. Hypertrophy greater in right ventricle. Grober, J. A. 1908.

HIBERNATION

The ancients believed that many birds hibernate during the winter. Some thought that swallows, for instance, might hibernate in the mud of streams, ponds, etc. This myth has been slow in disappearing from the literature.

Books. Text in German. Hirundinidae. Klein, J. T. 1760.

Text in Latin. Hirundinidae. Klein, J. T. 1750.

General. Argyll, G. D. 1877; Blake-Knox, H. 1867c; Confevron, —. 1895; Ferrouillat, A. 1922; Wesemüller, A. 1917a.

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cour, J. T. 1927a; Dureau de la Malle, A. J. 1856; Ghigi, A. 1903a, b, 1907a; Günther, A. C. 1887, 1904a, b; Guyer, M. F. 1908; Heinroth, O. 1906a; Huët, L. 1889; Martorelli, G. 1912; Phillips, J. C. 1915a; Poll, H. & Tiefensee, W. 1907; Rothschild, L. W. 1904. Phasianidae. Sundevall, C. J. 1846a. Ploceidae. Butler, A. G. 1906e; Decoux, A. 1920; Finn, F. 1900a. Psittacidae. Cosgrave, R. 1912. Sulidae. Worcester, D. C. 1911a, b. Tetraonidae. Brewster, W. 1877; Brooks, A. 1907; Buckley, T. E. 1895, 1898, 1900b; Collett, R. 1906; Goll, H. 1897; Malm, A. W. 1880a; Meyer, A. B. 1889; Ogilvie-Grant, W. R. 1909b; Phillips, E. C. 1892. Trochilidae. Berlioz, J. 1929; Hartert, E. J. 1900b; Ridgway, R. 1909; Rothschild, L. W. 1927b; Simon, E. L. 1910; Taylor, W. P. 1909. Turdidae. Blagg, E. W. 1911a; Butler, A. G. 1895; Collett, R. 1906; Dobbier, J. K. 1892; Fulljames, H. J. and others 1917.

Domestic birds. Weinland, D. F. 1864.

Song birds. Macpherson, H. A. 1883c.

Hybrids between species involving the following genera: *Acanthis*. Braun, F. 1913a, 1915c. *Aegithalos*. Stresemann, E. 1919b. *Alisterus*. Tavistock, M. 1927. *Anas*. Ackermann, K. 1897; Baillet, C. 1897; Devis, C. W. 1867; Elliot, D. G. 1892a; Geoffroy St. Hilaire, E. 1806; Jaubert, J. B. 1853; Rogeron, G. 1896. *Anser*. Ackermann, K. 1897; Gramm, —. 1912. *Anthus*. Brooks, W. E. 1876. *Apteryx*. Rothschild, L. W. 1893. *Aquila*. Baillet, C. 1897; Brooks, W. E. 1876. *Ara*. Martorelli, G. 1895b. *Baeolophus*. Allen, J. A. 1907. *Bernicia*. Gurney, J. H. 1850. *Buteo*. Baillet, C. 1897. *Certhia*. Dobbrick, L. 1924. *Chloris*. Weber, S. A. 1908. *Colaptes*. Baldwin, R. M. 1910; Breninger, G. F. 1898; Burns, F. L. 1900; Eaton, A. A. 1893c; Rhoads, S. N. 1892. *Columba*. Behm, A. 1910a; Ghigi, A. 1915; Service, R. 1903b. *Corvus*. Backhouse, J. 1901a; Baillet, C. 1897; Ghidini, A. 1910; Greppin, L. 1914; Haecker, V. 1904b; Meise, W. 1928; Snouckaert van Schauburg, R. C. 1907, 1910. *Cyanistes*. Baillet, C. 1897. *Dendroica*. Taylor, W. P. 1911. *Dicaeum*. Baker, E. C. 1898. *Euplocamus*. Mudge, G. P. 1913. *Falco*. Baillet, C. 1897. *Fringilla*. Bonhote, J. L. 1911a; Carrucio, A. 1891; Hilde-

brand, F. 1900; Jaubert, J. B. 1853; Ninni, E. 1920; Stresemann, E. 1923d. *Fuligula*. Arrigoni degli Oddi, E. 1906c. *Gallus*. Ackermann, K. 1897; Guyer, M. F. 1905b; Pearl, R. & Pearl, M. D. 1909; Vilaró, J. 1888-89. *Gallus temincki*. Lotsy, J. P. 1920. *Gennaeus*. Thomas, R. H. 1922. *Geopelia*. Carter, T. 1914. *Goura*. Mitchell, D. W. 1849. *Helminthophila*. Bishop, L. B. 1905b; Brewster, W. 1886a; *Faxon, W. 1911. *Hirundo*. Trotter, S. 1878. *Houbara*. Phillott, D. C. 1906. *Hypolaïs*. Brooks, W. E. 1876; Lie-Pettersen, O. J. 1909. *Lagopus*. Ackermann, K. 1897; Chamberlain, W. 1892; Collett, R. 1873, 1886, 1897; Nilsson, S. 1845; Ogilvie-Grant, W. R. 1907b, 1908d. *Larus*. Lönnberg, A. J. 1919d. *Lyrurus*. Nilsson, S. 1845. *Merula*. Butler, A. G. 1906b. *Muscicapa*. Boetticher, H. 1925. *Nucifraga*. Hess, A. 1912. *Numida*. Vilaró, J. 1888-89. *Paradisaea*. Ménégau, H. A. 1915. *Passer*. Gurney, J. H. Jr. 1889a; Harting, J. E. 1894. *Pavo*. Finn, F. 1926; Poll, H. 1920a. *Phasianus*. Corbin, G. B. 1900; Hachisuka, M. 1926a; Pelzel, A. 1881; Phillips, J. C. 1913b, 1921; Rothschild, L. W. 1913b; Sclater, P. L. 1869; Stephan, P. 1903b, d, 1906a, b; Tegetmeier, W. B. 1900; Thomas, R. H. 1909, 1915; Vilaró, J. 1888-89; Wenig, J. 1930; Witherby, H. F. 1913d; Yarrell, W. 1837. *Piranga*. McCormick, L. M. 1893. *Platycecus*. North, A. J. 1904. *Poëphila*. Seth-Smith, D. 1906. *Polytelis*. Astley, H. D. 1924. *Pyrrhula*. Johansen, H. 1911. *Ruticilla*. Baillet, C. 1897. *Serinus*. Braun, F. 1914; Heinroth, O. 1906c; Lazarus, —, 1880; Liebe, K. T. 1868; Liebscher, F. L. 1876; Seewald, K. 1880; Stephan, P. 1903d, 1906a, b. *Streptopelia*. Blagg, E. W. 1891; Stephan, P. 1903d, 1906a, b; Strong, R. M. 1911c. *Struthio*. Duerden, J. E. 1919a; Anon. 1920b. *Tetrao*. Daguin, F. 1909; Gloger, C. W. 1854; Lucanus, F. K. 1918; Nilsson, S. 1845; Southwell, T. 1906; Wilson, J. 1845; Yarrell, W. 1830-31. "Rackelhahn." Lazarini, L. 1892. *Thaluranina*. Butler, A. L. 1927. *Turdus*. Aplin, O. V. 1892b; Butler, A. G. 1905b; Christy, R. M. 1885; Suchetet, A. 1895b. *Turtur*. Dalglish, G. 1902. *Vermivora*. Carter, T. D. & Howland, R. H. 1923.

Hybrids between the following species:

Acanthis c. cannabina × *A. linaria cabaret*. Macpherson, H. A. 1883d.

Acanthis c. cannabina × *Serinus*. Neu, J. 1880b.

Acanthis c. cannabina × *Spinus*. Lönnberg, A. J. 1918.

Acanthis linaria × *Carduelis carduelis*. Stresemann, E. 1906.

Acanthis linaria × *Chloris chloris*. Grille, R. 1908.

Acanthis linaria cabaret × *A. flavirostris*. Silver, A. 1918.

Acanthis linaria & *A. flavirostris* × *Serinus canarius*. Braun, F. 1915c.

Aidemosyne modesta × *Peophila personata*. Sich, H. L. 1909.

Alauda arvensis × *A. arborea*. Landois, H. 1876a.

Alectoris barbara × *A. graeca*. Moltoni, E. 1924.

Anas × *Mergus*. Fritsch, A. J. 1905.

Anas [Dafila] acuta × *A. [Chaulelasmus] strepera*. Crommelin, J. P. 1867.

Anas boschas [platyrhynchos] × *A. [Dafila] acuta*. Beyer, G. E. 1900a; Coues, E. B. 1874; Crommelin, J. P. 1867; Cross, W. 1890; Felger, A. H. 1903b; Karejév, S. A. 1910; Martorelli, G. 1901a; Ninni, E. 1920; Rothschild, L. W. 1923b.

Anas boschas × *A. clypeata*. Tschusi zu Schmidhoffen, V. 1885.

Anas boschas × *A. moschata*. Sundevall, C. J. 1846a.

Anas boscas × *A. penelope*. Laidlaw, T. G. 1914.

Anas boscas × *A. [Chaulelasmus] strepera*. Sclater, W. L. 1891.

Anas boschas × *Anser*. Taibell, A. M. 1930a.

Anas boschas × *Cairina*. Stölker, C. 1870b.

Anas boscas × *Chaulelasmus streperus*. Pavesi, P. 1893b.

Anas boschas × *Dafila acuta*. Poliakov, G. I. 1908.

Anas boscas × *Mergus merganser*. Tschusi zu Schmidhoffen, V. 1891a.

Anas boscas × *Netta rufina*. Zardnyi, N. A. 1908.

Anas boschas × *Nettion carolinensis*. Stone, W. 1903.

Anas boschas × *Querquedula crecca*. Lilford, B. 1895.

Anas boschas × *Spatula clypeata*. Arrigoni degli Oddi, E. 1906b.

Anas clangula × *Mergus albellus*. Sundevall, C. J. 1846a.

Anas crecca × *A. boschas*. Sievertsov, N. A. 1883a.

Anas c. crecca × *A. penelope*. Smith, J. B. 1913.

Anas [*Cairina*] *moschata* × *A. boschas*. Yarrell, W. 1832b.

Anas p. platyrhynchos × *Cairina moschata*. Praeger, W. E. 1926.

Anas superciliosa × *A. boschas*. White, T. 1885, 1886.

Anser × *Branta*. Lotsy, J. P. & Kuiper, K. 1922.

Anser × *Cygnopsis*. Lotsy, J. P. & Kuiper, K. 1922.

Anser × *Cygnus*. Sundevall, C. J. 1845a.

Anser anser × *Cygnus olor*. Voss, F. 1928.

Anser anser × *Melanonyx segetum*. Gurney, J. H. Jr. 1885.

Anser cinereus × *Cygnus musicus*. Sundevall, C. J. 1846a.

Anthus pratensis × *A. trivialis*. Rowan, W. 1919.

Aythya ferina × *Nyroca nyroca*. Poliakov, G. I. 1909.

Bernicla brenta × *Anser albifrons*. Hartert, E. J. 1893a.

Branta leucopsis × *Anser fabalis*. Csörgey, T. 1926a.

Bucephala clangula × *Mergellus albellus*. Arrigoni degli Oddi, E. 1923.

Cairina × *Anas*. Finn, F. 1900b.

Cairina moschata × *Chenalopes aegypticus*. Lecaillon, A. 1922b.

Callipepla × *Lophortyx*. Bailey, V. 1928.

Cannabina × *Ligurinus*. Kempen, C. 1899.

Cannabina linota × *C. flavirostris*. Kempen, C. 1899.

Carduelis carduelis × *Acanthis flavirostris*. Silver, A. 1918.

Carduelis carduelis × *Chloris chloris*. Chigi, F. 1904.

Carduelis carduelis × *Pyrrhula pyrrhula*. Floericke, C. E. 1897; Lönnberg, A. J. 1922a, 1925a.

Carduelis carduelis × *Serinus*. Cookson, G. 1839-40; Doebner, E. P. 1862; Giebel, C. G. 1870; Larcher, O. 1866; Trost, J. 1865.

Carduelis elegans × *Ligurinus chloris*. Friederichs, K. 1905.

Carduelis spinus × *Linota cannabina*. Harting, J. E. 1896a.

Chenopsis atrata × *Branta canadensis*. Phillips, J. C. 1928a.

Chloris chloris × *Acanthis*. Gurney, J. H. Jr. 1887.

Chloris chloris × *Acanthis c. cannabina*. Hancock, J. 1890; Macpherson, H. A. 1883b; Whitaker, J. 1883.

Chloris chloris × *Carduelis elegans*. Chigi, F. 1916; Hildebrand, F. & Böker, H. 1914; Klein, A. 1894.

Chloris chloris × *Spinus*. Gurney, J. H. Jr. 1887.

Chrysomitris spinus × *Acanthis linaria*. Lorenz, T. K. 1890.

Colinus virginianus × *Lophortyx californica*. Aiken, C. E. 1930.

Columba × *Streptopelia risoria*. Gadeau de Kerville, H. 1885, 1891.

Columba × *Turtur* [*Streptopelia risoria*]. Service, R. 1900.

Columba palumbus × *C. livia*. Fries, —. 1913b; Podmore, P. S. 1903.

Columba palumbus × *C. oenas*. Podmore, P. S. 1903.

Columba palumbus × *C. turtur*. Podmore, P. S. 1903.

Columba palumbus × *Streptopelia risoria*. Stephan, P. 1903b.

Corvus cornix × *C. corone*. Macpherson, H. A. 1896; Thienemann, J. 1896, 1902b, 1903b; Werner, P. 1906b.

Corvus corone × *C. cornix*. Godfrey, R. 1898a.

Cyanistes cyaneus × *Poecile borealis*. Madarász, G. 1884.

Cygnopsis cygnoides × *Cygnus olor*. Voss, F. 1921.

Cygnus × *Anser*. Giebel, C. G. 1855a; Crommelin, J. P. 1868.

- Cygnus atratus* × *C. albus*. Pissot, C. E. 1868.
- Cygnus atratus* × *C. olor*. Noll, F. C. 1868; Schmidt, M. 1868a.
- Cygnus olor* × *Anser cinereus domesticus*. Crommelin, J. P. 1867.
- Dafila* × *Anas*. Phillips, J. C. 1915a.
- Dafila acuta* × *Anas boschas*. Lecailon, A. 1922a; Morris, F. O. 1836a; Ninni, E. 1902b.
- Dafila acuta* × *Querquedula crecca*. Arrigoni degli Oddi, E. 1889a; Saunders, H. 1895.
- Dendragapus obscurus fuliginosus* × *Phasianus torquatus*. Anthony, A. W. 1899.
- Diardigallus diardi* × *Gennaeus melanotus*. Martorelli, G. 1912.
- Dryobates nuttallii* × *D. pubescens*. Ridgway, R. 1887b.
- Emberiza citrinella* × *E. leucocephala*. Pleske, T. D. 1887.
- Emberiza citrinella* × *E. schoeniclus*. Hancock, J. 1890.
- Fringilla* × *Passer chloris*. Stephan, P. 1903a.
- Fringilla carduelis* × *F. chloris*. Macpherson, A. H. 1890b.
- Fringilla carduelis* × *Serinus canarius*. Hirt, P. 1901.
- Fringilla c. coelebs* × *Chloris c. chloris*. Paterson, J. M. 1912.
- Fringilla c. coelebs* × *F. montifringilla*. Kempen, C. 1899; Moschen, L. 1880; Schaeck, F. 1912; Silver, A. 1907; Stresemann, E. 1923d.
- Fuligula cristata* × *F. ferina*. Howard, R. J. 1886; Saunders, H. 1886.
- Fuligula* [*Nyroca*] *ferina* × *F. cristata*. Arrigoni degli Oddi, E. 1887c.
- Fuligula* [*Nyroca*] *ferina* × *F. nyroca*. Arrigoni degli Oddi, E. 1906c.
- Gallicolumba zanthonura* × *G. jobiensis*. Gifford, E. W. 1928.
- Gallinula chloropus* × *Fulica atra*. Kreve, H. 1892.
- Gallus* × *Meleagris*. Shepard, E. M. 1883.
- Gallus* × *Menura superba*. Finsch, O. 1892.
- Gallus* × *Numida*. Moltoni, E. 1929; Morton, S. G. 1847; Saint-Quentin, A. 1906; Trutat, E. 1875-76.
- Gallus* × *Ocydromus*. Murie, J. 1890.
- Gallus* × *Phasianus*. Angus, W. C. 1871; Haecker, V. 1904b.
- Gallus bankiva* × *Numida meleagris*. Vilaró, J. 1897.
- Gallus sonnerati* × *Gallus*. Ghigi, A. 1916a.
- Geococcyx* × *Gallus*. Webster, C. L. 1897.
- Glareola pratincola* × *G. melanoptera*. Schittkow, B. 1897.
- Graphophasianus soemmeringi* × *Calophasis ellioti*. Ghigi, A. 1912b.
- Habropyga cinerea* × *H. melpoda*. Morawitz, F. F. 1883.
- Helminthophila* [*Vermivora*] *chrysoptera* × *H. [V.] pinus*—*H. leucobronchialis*. Faxon, W. 1913; Fisher, A. K. 1885; Meeker, J. C. 1906.
- Helminthophila* [*Vermivora*] *pinus* × *H. [V.] chrysoptera*. Osgood, W. H. 1907a; Sage, J. H. 1889.
- Hirundo erythrogaster* × *Petrochelidon a. albifrons*. Mearns, E. A. 1902.
- Hirundo rustica* × *H. urbica*. Hoyer, E. F. 1876a; Sundevall, C. J. 1846a.
- Lagopus* × *Lyrurus*. Millais, J. G. 1909a.
- Lagopus* × *Tetrao*. Lorenz, T. K. 1891.
- Lagopus* × *Tetrao u. urogallus*. Appellöf, J. J. 1891.
- Lagopus* × *Tetrastes*. Kolthoff, G. I. 1888.
- Lagopus albus* × *Tetrao tetriz*. Collett, R. 1886.
- Lagopus albus* × *Tetrao u. urogallus*. Pearson, H. J., De Winton, W. E., & Backhouse, J. 1894.
- Lagopus lagopus* × *L. scoticus*. Kihlén, G. 1914.
- Lagopus lapponicus* × *Tetrao tetriz*. Collett, R. 1873.
- Lagopus scoticus* × *Gallus domesticus*. Millais, J. G. 1899.
- Lagopus scoticus* × *L. lagopus*. Schaanning, H. T. 1925.

Lagopus scoticus × *L. mutus*. Ogilvie-Grant, W. R. 1908d.

Lagopus scoticus × *Lyrurus tetriz*. Macpherson, H. A. 1897b; Millais, J. G. 1909b; Ogilvie-Grant, W. R. 1909a.

Lagopus [*Tetrao*] *urogallus* × *L.* [*T.*] *albus*. Grieg, J. A. 1889.

Lanius dichrourus × *Otomela karelini*. Menzbir, M. A. 1894.

Lanius senator × *L. collurio*. Salzmänn, E. 1908.

Larus a. argentatus × *L. f. fuscus*. Smith, C. 1883.

Larus fuscus × *L. leucopterus*. Lönnberg, A. J. 1919c.

Larus glaucus × *L. fuscus*. Palmgren, R. 1920.

Lophortyx gambeli × *L. californicus*. Henshaw, H. W. 1885.

Lyrurus × *Lagopus*. Lönnberg, A. J. 1904b.

Lyrurus t. tetriz × *Lagopus scoticus*. Smith, J. A. 1863a.

Lyrurus t. tetriz × *Phasianus*. Angus, W. C. 1887a; Fritze, A. 1904; Jourdain, F. C. 1906a, b, c, 1912; Meyer, A. B. 1886a; Millais, J. G. 1906b; Pyecraft, W. P. & Millais, J. G. 1906.

Lyrurus t. tetriz × *Tetrao*. Carmichael, G. H. 1897.

Lyrurus t. tetriz × *Tetrastes*. Dresser, H. E. 1876; Kolthoff, G. 1893.

Mareca penelope × *Dafila acuta*. Dal Fiume, C. 1893.

Mareca penelope × *Mareca americana*. Bailey, H. H. 1919.

Meleagris × *Phasianus*. Edwards, G. 1761.

Meleagris gallopavo × *Tetrao urogallus*. Sundvall, C. J. 1846a.

Mergus × *Anas*. Blaauw, F. E. 1907b.

Merula ruficollis × *M. atrigularis*. Pleske, T. D. 1839.

Metopia peposaca × *Netta rufina*. Neunzig, R. 1924c.

Motacilla flava × *M. melanocephala*. Pleske, T. D. 1887.

Motacilla yarrelli × *M. a. alba*. Tuck, J. G. 1891.

Numida × *Gallus*. Beddard, F. E. 1899b; Finn, F. 1902d; Guyer, M. F.

1905a, 1909; Kempen, C. 1907; Schlater, P. L. 1899b; Willemoes-Suhm, R. 1865b.

Numida × *Pavo*. Ghigi, A. 1900.

Numida meleagris × *Numida ptilorhyncha*. Ghigi, A. 1907c.

Ocydromus earli × *Gallus*. Buller, W. L. 1876a.

Oreortyx × *Lophortyx*. Peck, M. E. 1911a.

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Changes with age. *Gallus*. Reich, O. 1921.

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Effect of eclipse plumage. Anatidae. Percy, W. R. 1926.

Growth of young. See also under Growth. *Cariama cristata*. Heinroth, O. 1924a. Young birds. Austral region. Ménégau, H. A. 1908.

Senescence rate measured by decline in egg production. *Gallus*. Brody, S., Henderson, E. W., & Kempster, H. L. 1923.

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FLEDGING PERIODS

General. Brock, S. E. 1910a; Brown, R. H. 1926; Longstaff, T. G. & Jourdain, F. C. 1926a, b; Shaw, W. 1926. British birds. Alford, C. E. 1926; Carlyon-Britton, R. 1926; Longstaff, T. G. & Jourdain, F. C. 1926a, b.

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LIMBS

See also under Integument, Locomotion, Myology, and Skeleton.

Development. *Cypselus melba*. Zehnter, L. 1889. *Vanellus*. Graul, W. 1907.

Homologies. Comparative. Includes birds. Ryder, J. A. 1887.

Morphologic comparison of fore and hind limbs. Humphrey, G. M. 1876.

Phylogeny. Includes birds. Geddes, A. C. 1912.

Thigh. Anatomy. Méry, J. 1732.

LEGS

Action of legs compared with wings. Includes birds. Humphrey, G. M. 1876.

Anatomy. Alix, H. E. 1863a, b; Müller, E. 1908b; *Stolpe, M. 1902. *Gallus*. Müller, H. F. 1859. Includes birds. Book. Text in French. Flourens, M. J. 1843a.

Broken leg healing. *Columba*. Howe, R. H. 1905.

Creeping fowl leg condition. *Gallus*. Cutler, I. E. 1925.

Feet

General. Beebe, C. W. 1906c; Finn, F. 1894a; Kermod, P. M. 1882; Mitchell, P. C. 1894a. Many species. Schweder, G. 1908. *Coracias*. Sharpe, R. B. 1871. *Haliaeetus*. Couch, J. 1872. *Lynx*. Günther, A. C. 1890. *Lanius*. Miller, A. H. 1931. *Struthio camelus*. Riley, H. 1836.

Development. *Anas*. Sieglbauer, F. 1911. *Fringilla* & *Hirundo*. Agassiz, J. L. 1848. *Pygoscelis*. Sieglbauer, F. 1911. *Sylvia* & *Turdus*. Agassiz, J. L. 1848.

Measurements. Blechschmidt, H. 1929.

ANATOMY

Book. Text in English. *Ramphastos toco*. Gould, J. 1838-35.

Text in Latin. Klein, J. T. 1759.

General. Lucas, F. A. 1894a; Méry, J. 1732; *Steinbacher, G. 1935b. Picidae. Scharnke, H. 1930b. Trogonidae. Blyth, E. 1838a.

Arterio-venous anastomoses. Many species. *Schumacher, S. 1915a.

Bones. Many species. Regalia, E. 1910. Picidae. Scharnke, H. 1930b.

Heel pads. Thickening of integument. See also under Integument. Chasen, F. N. 1923. Capitonidae. Slater, P. L. & Evans, A. H. 1910. *Cyanops*. Pycraft, W. P. 1899c. Picidae. Slater, P. L. & Evans, A. H. 1910. *Selenidera*. Seth-Smith, D. 1913a.

Muscles. See also under Myology. Picidae. Scharnke, H. 1930b.

Perching mechanism. Berge, R. 1905; Watson, M. 1869.

Tendons

Deep plantar tendons. Trochilidae. Gadow, H. F. 1895.

Rotator tendons. *Circus gallicus*, *Helotarsus*, *Pandion*, & *Polyborus*. Waga, K. 1924a.

Cartilaginous structures

Cartilage of tendons. *Columba*, *Fringilla*, & *Gallus*. Ranvier, L. A. 1889a.

Chondroid plaques between or upon tendons. Many species. Schaffer, J. 1902b, 1903. *Passer*. Schaffer, J. 1902a.

PHYSIOLOGY OF FOOT

General. *Steinbacher, G. 1935b. *Picidae*. Scharnke, H. 1930b.

Male sex hormone effect on color of foot. *Larus ridibundus*. van Oordt, G. J. & Junge, G. C. 1930.

Mechanics

General. *Buteo*, *Columba*, *Corvus*, *Numenius*, *Passer*, *Scolopax*, *Sula*, & *Tetrao*. Schaffer, J. 1903.

Action of bones and muscles of foot. *Picidae*. Scharnke, H. 1930b.

POSITION OF FEET IN FLIGHT

General. Many species. Townsend, C. W. 1909a. *Picarian birds*. Finn, F. 1898b.

Position in flight during cold weather. *Larus* & *Totanus pugnax*. Heinroth, O. 1900a.

Prehension. *Corvus*. Chamberlain, M. 1884. *Passeres*. Finn, F. 1898b.

TOES

Book. Text in German. *Struthio*. Rabl, C. 1910.

Arrangement. *Circæetus*, *Helotarsus*, & *Pandion*. Warga, K. 1924a. *Pici*. Reh, L. 1910b. *Polyborus*. Warga, K. 1924a. *Psittaci*. Reh, L. 1910b.

Degeneration. *Struthio*. Duerden, J. E. 1920b.

Muscles. Kopperi, A. J. 1928.

Muscles and tendons in hyperdactylia. *Gallus*. Grönberg, G. 1894.

Passerine bird with three toes. *Cholornis*. Finn, F. 1894b.

Special type of chordoid connective tissue with fat infiltration. *Anser*, *Athene*, *Bonasa*, *Cuculus*, *Enneoctonus*, *Gallus*, *Garrulus*, *Nucifraga*, *Passer*, *Tetrao*, & *Turdus*. Schumacher, S. 1915b.

Structure in a three-toed individual. *Struthio*. Hewitt, J. 1913.

Variation. Forbes, W. A. 1882m.

Vestigial phalanges. *Struthio*. Wray, R. S. 1887a.

Webbing. *Spheniscidae*. Oustalet, E. 1900.

Zygodactylous or yoked toe arrangement, two in front and two behind. Beebe, C. W. 1906c. Use. Sheppard, R. 1918.

Rudimentary hallux

General. *Diomedea*. Finn, F. 1894a. *Rissa tridactyla*. Clarke, W. E. 1892.

Birds commonly described as three-toed. *Procellariiformes*. Forbes, W. A. 1882d.

WINGS

General. Alix, H. E. 1874b; Degen, E. 1894; Flower, W. H. 1887. Many species. Sundevall, C. J. 1843, 1886. Includes birds. Tschan, A. 1889.

Anas. Sieglbauer, F. 1911. *Aptenodytes*. Wagner, R. 1827b. *Archaeopteryx*. Heinroth, O. 1923; Pycraft, W. P. 1894. *Casuarinus*, *Colymbus*, *Nycteus*, *Nyctinomus*, *Podiceps*, & *Puffinus*. Wagner, R. 1827b. *Pygoscelis*. Sieglbauer, F. 1911. *Rhea*. Schestakowa, G. S. 1925. *Rhinolophus*. Wagner, R. 1827b. *Struthio*. Geoffroy St. Hilaire, E. 1799.

Development. Schestakowa, G. S. 1927. *Eudytes*. *Hillel, E. 1904. *Rhea*. Schestakowa, G. S. 1925. *Sterna hirundo*. Leighton, V. L. 1894.

Form. Blasius, J. H. 1857. Diagrams. *Legal, E. & Reichel, P. 1879-85.

Measurements. Blasius, J. H. 1857; Bohin, L. S. 1912.

Proportions. Changes during development. Marples, B. J. 1930.

Quintocubitalism. *Columbae*. *Mitchell, P. C. 1899.

Taxonomic consideration. Sundevall, C. J. 1846b.

Weights. Magnan, A. 1912l.

Anatomy

General. Alix, H. E. 1863a, b; Antoni, G. 1925; Blasius, J. H. 1857, 1866; Flourens, M. J. 1843a; Müller, E. 1908b; Strong, R. M. 1917b; Sundevall, C. J. 1843. *Coracornithes*. *Buri, R. O. 1900. *Gallus*. Müller, H. F. 1859. *Macrochires*. Shufeldt, R. W.

1890d. *Micropus melba*. Buri, R. O.
1900. *Opisthocomus cristatus*. Banzhaf, W. 1929. Procellariiformes. Reinhardt, J. T. 1873a, b.

Bones. See also under **Skeleton**.
Garrod, A. H. 1875e.

Elbow joint. Includes birds. Hara, S. 1928.

Fascia. Many species. Sundevall, C. J. 1843, 1886.

Fingers. Jeffries, J. A. 1881a.

Hand position. Birds incidental.
Martins, C. F. 1872.

Length of wing. *Cygnus*. Book.
Text in English. Harting, J. E. 1883a.

Ligaments. Many species. *Pelissier, M. 1923; Robin, C. P. & Chabry, L. M. 1884; Sundevall, C. J. 1843, 1886.

Mathematical description of acuity of wing. Magnan, A. 1913a.

Modifications. Flightless birds.
Morgan, M. A. 1912.

Muscles. Buchet, G. 1885, 1888, 1892; Garrod, A. H. 1875e.

Sesamoid bones. Many species.
Robin, C. P. & Chabry, L. M. 1884.

Patagium

General. *Ardea*. Lauth, E. A. 1830.

Tensores patagii. Beddard, F. E. 1888c.

Flight area

General. Engel, J. 1913. Many species. Müllenhoff, K. 1885a. Falcones. Shufeldt, R. W. 1881c. *Phalacrocorax harrisi*. Gadow, H. F. 1902.

Body weight relation. Magnan, A. 1913d. Marine birds. Magnan, A. 1914a.

Diagrams. *Legal, E. & Reichel, P. 1879-85.

Weights of heart and pectoral muscles relation. Magnan, A. 1913b, c, g.

TENDONS

General. Many species. Robin, C. P. & Chabry, L. M. 1884.

In patagium. *Bucorvus*. Derscheid, J. M. 1924.

Physiology

See also under **Locomotion**.

Function. Blasius, J. H. 1866; Lancaster, J. 1886d.

Use of one wing in preserving equilibrium. *Carpodacus*. Fisher, W. H. 1903.

Bastard wing function. *Ciconia* & *Columba*. Fisher, W. H. 1902.

MECHANICS

General. Alix, H. E. 1874f; Pettigrew, J. B. 1870, 1872. *Columba*. Collins, D. B. 1903.

Action of bones and ligaments. *Anas* [*Dafila*] *acuta*. Wyman, J. 1855b.

Adaptation to flight. See also under **Adaptation**. Anon. 1733a.

Automatic movements of hand. Buchet, G. 1895.

Locking joint in flight. *Anas* [*Dafila*] *acuta*. Wyman, J. 1855b.

Locking of primaries in soaring flight. Coues, E. B. 1887.

Mechanism of flexion and extension. Coues, E. B. 1871b.

Movements of radius and ulna in flight. Bergmann, C. G. 1839.

Strength of wing. *Cygnus*. Harting, J. E. 1896b.

Structure in relation to flight. Newberry, J. S. 1887.

Use of one wing in fighting and in defense. Fisher, W. H. 1903.

LIVER, INCLUDING GALL BLADDER AND DUCTS

Books. Text in English. Owen, R. 1866-68.

Text in German. Many species. Gadow, H. F. 1891d; Tiedemann, F. 1810-14.

Text in Latin. *Gallus*, pp. 241-246. Weber, E. H. [1834]-1851.

Ardeidae. Mitchell, P. C. 1913a. *Cereopsis novae hollandiae*. Yarrell, W. 1831a. *Corythaix* [*Turacus*] *buffoni*. Martin, W. C. 1836a. *Eurynorhynchus*. Anderson, J. 1879b. *Gallus*. Müller, J. P. 1830b. *Rhinochaetes jubatus*. Marshall, W. A. 1870. Spheniscidae. Filhol, H. 1884.

Periodic changes in color. *Gallus*. *Weber, E. H. 1850.

Size ratio in embryo. *Gallus*. Leveillé, J. B. 1798-99.

Weights after bleeding. Magnan, A. 1912h.

Anatomy

General. Ferrein, A. 1753a, b. Includes *Gallus*. Guillot, N. 1848.

Biliary (cystic) ducts. Baumann, A. & Schmotzer, B. 1912. *Anas*. Weber, A. & Ferret, P. 1903. *Ardea*. Jacobaeus, O. 1675b. *Dromaeus* [*Dromiceius*] *novae-hollandiae*. Boulart, R. 1900.

Topographic relations. Includes *Gallus*. Fleischmann, A. 1924.

HISTOLOGY

General. Meyer, W. 1921. Includes *Anser*. Krause, R. 1893. *Columba*. *Buch, H. 1912; Krause, R. 1893; Shore, T. W. & Jones, H. L. 1889. *Corvus*. Krause, R. 1893. Includes *Gallus*. Eberth, C. J. 1867; Mall, F. P. 1906; Shore, T. W. & Jones, H. L. 1889.

Biliary tract. *Gallus*. Rohrsen, W. 1925.

Epithelial cells. Includes *Anas*, *Gallus*, & *Strix*. Leidy, J. 1848.

Reticular fibers. *Columba* & *Gallus*. Schumkow-Trubin, K. G. 1909.

Development

General. Includes *Anas*. Froben, F. 1892; Hildebrandt, W. 1902; Ludwig, E. 1919; Weber, A. 1902d, f. *Anser*. Cuccati, G. 1890b. *Columba*. *Brouha, M. 1898a; Hildebrandt, W. 1902. *Gallus*. *Brouha, M. 1898a, b; Choronschitzky, B. J. 1900; Felix, W. 1892; Froben, F. 1892; Hildebrandt, W. 1902; Jones, C. H. 1849. *Melopsittacus*. Hildebrandt, W. 1902.

Development of chorio-allantoic grafts of blastoderm containing liver rudiment. *Gallus*. Willier, B. H. & Rawles, M. E. 1931a.

Physiology

Book. Text in Latin. *Gallus*. Weber, E. H. [1834]–1851.

Absence of uropoietic ferment. *Anas*. Chassevant, A. & Richet, C. 1898.

Amylolytic action of liver. *Columba*. Tiger, R. & Simonnet, H. 1921.

Bile. Absorbed or excreted? Includes birds. Hoppe-Seyler, F. 1863.

Color and consistency of bile. *Gallus*. Leveillé, J. B. 1798–99.

Creatine metabolism. Paton, D. N. & Mackie, W. C. 1912.

Extirpation, effects on metabolism. *Anser*. Minkowski, O. 1886.

Function in embryo. *Gallus*. Weber, E. H. 1846, 1851.

Glycogen content. *Columba*. Rando, L. & Lelesz, E. 1925.

Hematopoiesis in liver of embryo. Includes *Gallus*. Weber, E. H. 1846.

Iron in liver. Scharnke, H. 1933. Many species. Lapique, L. & Petetin, J. 1909.

Pigment storage in embryo liver. *Gallus*. Ozu, U. 1924.

Sex and seasonal differences in weight. *Streptopelia*. Riddle, O. 1928a.

Silicic acid in liver. *Anser*. Cerny, C. 1909.

Testis, influence on glycogen production. Pézard, A. 1911a.

GALL BLADDER

Books. Text in English. Owen, R. 1866–68.

Text in German. Many species. Gadow, H. F. 1891d; Tiedemann, F. 1810–14.

Capitonidae. Forbes, W. A. 1882g. *Carpococcyx*. Beddard, F. E. 1901c. *Chordeiles*. Wetmore, [F.] A. 1915a. *Gallus*. Leveillé, J. B. 1798–99. Rhamphastidae. Forbes, W. A. 1882g.

Absence of gall bladder. Includes *Columba*. Scammon, R. E. 1916.

Absence or presence of gall bladder. Psittacidae. Garrod, A. H. 1877a.

Form, size, and capacity of gall bladder. Many species. Crisp, E. 1862c.

LOCOMOTION

See also under Adaptation, Myology, and Skeleton.

Book. Text in English. Owen, R. 1866–68. Anatidae. Elliot, D. G. 1898.

Text in Latin. Birds incidental. Fabricius ab Aquapendente, H. 1618a.

General. Szymanski, J. S. 1918. Includes birds. Morvillo, V. 1890.

Young birds. Walter, A. 1877b. *Lanius*.
Miller, A. H. 1931. *Oidemia*. Lordat,
—, 1803.

Anatomy of organs of locomotion.
Alix, H. E. 1863a, b, 1875a, b.

Comparison of fore and hind limbs.
Includes birds. Humphrey, G. M. 1876.

Effects of experimental lesions of
brain. Langworthy, O. R. 1926.

Posture of neck. Effect on locomotion.
Gallus. Koppányi, T. & Kleitman, N. 1926.

CLIMBING

General. *Picus*. Feilden, H. W. 1908.

Organs. *Dryobates m. major*. Leigh,
A. G. 1911b.

FLIGHT

Books. Text in English. Allen,
G. M. 1925; Bannerman, D. A. 1930-
36; Davis, J. R. 1903; Headley, F. W.
1912; Pycraft, W. P. 1922. *Larus*.
Townsend, C. W. 1912b. *Leptoptilus*,
Milvus, *Neophron*, *Otogyss*, & *Pseudogyps*.
*Hankin, E. H. 1914.

Text in French. Barthez, P. J. 1798;
Esterno, H. P. 1865; Krarup-Hansen,
C. J. 1869; Marey, E. J. 1890. *Columba*.
Du Puy de Podio, M. V. 1877.

Text in German. Altum, B. 1868;
Precht, J. J. 1846; Schrank, F. P. 1801.

Text in Latin. Borelli, G. A. 1685.

General. Abel, O. 1911; Altum, B.
1875a; Argyll, G. D. 1877; Blix, M.
1885; Bohin, L. S. 1912; Brewster, W.
1912; Christoleit, E. 1933; Floericke, C.
E. 1914; Galvani, L. 1783; Geyr von
Schweppenbourg, H. 1933; Gibbs, R. M.
1894; Grosse, —, 1880; Henry, C. L.
1878; Jacquemin, E. 1835c; Laborde,
J. J. 1874; Lovas, E. 1911; M., R. 1866;
Marey, E. J. 1872, 1874b; Monteil, S.
1875; Petersen, K. 1923; Proctor, T.
1880; Wiedeburg, J. B. 1730; Winter,
W. 1893; Young, E. W. 1904. Include
birds. Liais, E. 1866; Wake, H. 1898.
Oceanic birds. Brooks, S. C. 1934;
Wilson-Baker, D. 1891.

Anatidae. Griscom, L. 1922-23.
Aquila. Enomoto, Y. 1922. *Archaeopteryx*.
Heinroth, O. 1923; Stellwaag,
F. 1916. *Columba*. Harris, E. D. 1868;
Townsend, C. W. 1915. *Diomedea*.
Sargent, H. 1881. *Gyps*. Peal, S. E.

1896. *Haliaeetus*. Herschel, J. 1873b.
Lanius. Miller, A. H. 1931. *Larus*.
Blake-Knox, H. 1867b; Brewster, W.
1912; Ellman, J. B. 1849; Miller, R. C.
1923. *Larus argentatus*. Strong, R. M.
1914. Trochilidae. Murphy, R. C. 1913.

Aesthetic consideration of flight.
Möbius, K. A. 1904.

Backward flight. Torrey, B. 1883.

Diet, importance of. Houssay, F. &
Magnan, A. 1911.

Distance limit of visibility to ob-
servers. Helm, A. F. 1902.

Downward flight. Anon. 1887a.

Evolution of flight. Doderlein, J.
1900; Hay, O. P. 1910; Lucas, F. A.
1916; Nopcsa, F. 1907; Schenkling-
Prévôt, C. 1895c.

Flightless birds. Wigglesworth, J.
1900. *Spheniscus*. Chassérlaud, R.
1912.

How does bird of prey hold booty in
flight? Kleinschmidt, O. 1893.

Manner of flight. Shakespeare notice.
Bree, W. T. 1834.

Nocturnal flight. Knight, V. 1871;
Mathew, G. F. 1871.

Nuptial flight. Book. Text in Eng-
lish. Pycraft, W. P. 1922. *Calypte*.
Hunt, R. 1920b.

Over sea flight. Frauenfeld, G.
1864a. *Columba*. Patterson, A. H.
1906b.

Power and endurance in flight. Mit-
telstrass, W. 1877. *Columba*. Hugue-
nard, E., Magnan, A., & Planiol, A.
1923.

Production of sound by wings. Bar-
rett-Hamilton, G. E. 1904b.

Purpose in soaring high. *Phalacrocorax*.
Gunn, D. 1927a.

Pursuit of prey. *Falco*. Carr, R.
1849.

Relation of long primaries to power
of flight. Averill, C. K. 1927.

Undulating flight. Causes. Murray,
I. D. 1908.

Upside down flight. *Gallinago*.
Stubbs, F. J. 1912b.

Volplaning. Sound produced by vi-
brating remiges. Witchell, C. A. 1896c.
Chordeiles. Hartman, F. A. 1914.
Cinclus. Miller, A. H. 1925.

Weather, effects of. Angele, —. 1906; Eckardt, W. R. 1913a, 1919c, d.

Altitude of flight

Book. Text in English. Pycraft, W. P. 1922.

General. Boer, —. 1925; Carpenter, F. W. 1906a; Chapman, F. M. 1888, 1896c; Deditius, K. 1902b; Forbes, H. S. & Forbes, H. B. 1927; Götz, W. H. 1926; Gunn, D. 1927b; Helm, A. F. 1900; Ingram, C. 1919b; Kleiner, H. 1907; Pütter, A. 1914; Schaeck, F. 1898; Schuster, W. 1904d; Scott, W. E. 1881; Stresemann, E. 1917a; Weigold, H. 1920. Many species. Lucanus, F. K. 1911b, 1912, 1913.

Migrating birds. Donald, C. H. 1923; Gröbbels, F. 1928; Thienemann, J. 1920–21. Palearctic birds. Meinertzhagen, R. 1920c. *Columba*. Hachet-Souplet, P. 1910. *Grus*. Peal, S. E. 1896. *Gymnogyps*. Rabes, O. 1904. *Leptoptilus*. Peal, S. E. 1896. *Micropus*. Stresemann, E. 1917a. *Pelecanus*. Peal, S. E. 1896.

Aeronautical observations on altitude of flight. Peal, S. E. 1881a, b. Book. Text in German. Lucanus, F. K. 1901b, 1929.

Effects of weather changes. *Columba*, *Linaria*, *Ligurinus*, *Lullula*, *Passer*, & *Tinnunculus*. Lucanus, F. K. 1904.

High altitude. *Sarcorhamphus gryphus*. Humboldt, F. H. 1830.

Relation of altitude in flight to air pressure and wind. Lucanus, F. K. 1903.

TELESCOPIC OBSERVATIONS

General. Evershed, J. O. 1895; Peal, S. E. 1881a, b; Tennant, J. F. 1875.

Birds flying across the face of the moon. Very, F. W. 1897; West, R. H. 1896.

VISIBILITY OF BIRDS AT DIFFERENT ALTITUDES

General. *Accipiter*, *Astur*, *Buteo*, *Corvus*, *Grus*, *Gypaëtus*, & *Numenius*. Lucanus, F. K. 1913.

Great altitudes. Lucanus, F. & Heinroth, O. 1911.

Duration and length of flight

General. Frauenfeld, G. 1864a; Seemann, W. 1898. *Columba*. Guppy,

H. B. 1903; Mégnin, P. 1898; Tegetmeier, W. B. 1892; Winkler, T. C. 1886; Anon. 1899c.

Effects of cold. *Columba*. Paris, P. 1898.

Flight from North America to Chile. *Hirundo*. Philippi, R. A. 1898.

Flock formation

General. Buturlin, S. A. 1907; Witchell, C. A. 1896c.

Causes of flock formations. Eckardt, W. R. 1919e.

Mechanics of flight including soaring or sailing flight

Books. Text in English. Collins, S. 1685; *Hankin, E. H. 1914; Lancheester, F. W. 1909a; Pycraft, W. P. 1922; Rayleigh, J. W. 1903; Villamil, R. 1920; Vinci, L. 1925.

Text in French. Alix, H. E. 1875a; Barthez, P. J. 1798; Giraud-Teulon, M. A. 1858; Krarup-Hansen, C. J. 1869; *Marey, E. J. 1878, 1890; Monteil, S. 1879; Mouillard, L. P. 1881; Planavergne, H. & Planavergne, L. 1872; Vinci, L. 1907. Predaceous birds. Huber, J. 1784.

Text in German. Hilzheimer, M. & Haempel, O. 1913; Kress, W. 1905; Lilienthal, G. 1923; Lilienthal, O. 1910; Loessl, F. 1896; Milla, K. 1895a; *Parseval, A. 1889; Prochnow, O. 1910; *Winter, W. 1895.

Text in Italian. Vinci, L. 1893, 1913.

Text in Latin. Borelli, G. A. 1685.

General. A., R. 1876; Abramowsky, E. 1913; Ahlborn, F. 1896, 1900, 1921, 1922; Airy, H. 1873, 1883b; Aldborough, —. 1867; Alexander, H. F. 1869; Alix, H. E. 1863b, 1875b; Allis, T. 1844b; Alpheraky, S. N. 1909; *Amans, P. C. 1885, 1892, 1908, 1911a, b, c, 1912b, 1913–14, 1915; *Angele, —. 1906; Anthony, R. L. 1910; Antoni, G. 1925; Argyll, G. D. 1874; Artingstall, F. D. 1866, 1867, 1870, 1873; Ashworth, H. P. 1896; Atkinson, G. F. 1888; Audreville, C. du H. 1879; Baines, A. C. 1889, 1891; Barrett-Hamilton, G. E. 1903b; Bartrum, C. O. 1890; Bateman, A. W. 1881; Bazin, A. 1923; Bertin, E. 1874; Bertinet, E. 1887; Bertrand, J. 1871a, b; *Biedermann, R. 1896; Blatz, C. 1907a; Blix, M. 1890a, b; Böcklin, A. 1886; Böker, H. 1927a; Brearey,

- F. W. 1877, 1878, 1879a, b, 1881, 1882; Bretonnière, J. 1889, 1894, 1898; Brewster, W. 1912; Brooks, W. K. 1874; Bryan, G. H. 1896; Buttenstedt, C. 1902; Buturlin, S. A. 1907; Cagniard-Latour, —. 1837a, b; Campbell, A. C. 1881; Car, L. 1914; Cayley, G. 1809; Ceruti, G. 1924; Chabrier, J. 1820, 1829; Chamier, J. A. 1925; Chassérlaud, R. 1912; Clark, A. H. 1925; Clément, H. & Chapeaux, E. 1927; Clough, G. E. 1923; Coues, E. B. 1888b; Courtenay, R. 1883, 1889; Davidson, G. L. 1898; Davidson, R. O. 1858; Davis, W. M. 1896; Deprez, M. 1908; Dinelli, L. M. 1911, 1925; Dollo, L. 1889; Drzewiecki, S. 1889; *Dubochet, J. A. 1834; *Ducos, F. 1912; Eckardt, W. R. 1913b, 1919e; Engel, J. 1913; Erhard, H. 1914; Finsterwalder, S. 1903; Fischer-Sigwart, H. 1916b; Fisher, O. 1890; Fitzgerald, M. F. 1899; Forrest, H. E. 1897-1900; Foucou, F. 1864; Fournier, L. 1910; Frölich, W. 1912; Frost, P. 1893; Froude, R. E. 1889; Fullerton, J. D. 1925; Funcke, H. 1894; Geoffroy St. Hilaire, E. 1838; Gerlach, E. 1886; Gibbs, R. M. 1894; Gilbert, E. S. 1879; Gilbert, G. K. 1888-89; Giraud-Teulon, M. A. 1856; Gostling, D. E. 1871; Gröbbels, F. 1922b; Gunn, D. 1927a; Guthrie, F. 1873, 1890; H., G. W. 1891; Häberlin, C. 1903; Hall, E. H. 1912; *Hankin, E. H. 1921, 1923a, b, 1924; Hardcastle, H. 1924-25; Hargrave, L. 1897, 1900; Hart, I. B. 1923; Hazen, H. A. 1893; Headley, F. W. 1907b; Hendricks, J. E. 1886a, b; Hensel, C. 1914; Hermann, O. 1898, 1911; Herschel, J. 1873a, b; Herz, M. 1889; Hoff, W. 1919; Hogg, H. R. 1896; Holder, J. B., Trowbridge, W. P., and others 1888; Holst, E. 1933; Hoskins, L. M. 1889; Houssay, F. 1914, 1919; Hous-say, F. & Magnan, A. 1912a, b; *Huf-faker, E. C. 1897; Huguenard, E., Magnan, A., & Planiol, A. 1923; Hume, A. O. 1887; Hureau de Villeneuve, A. 1880, 1890; Jameson, H. G. 1890; Johnson, W. D. 1894; Jones, F. W. 1926; Jovanowitsch, M. 1876; Kahn, L. 1924; Kargl, L. 1870-71; Karpen, N. V. 1913, 1923; Kent, W. 1889; Kimball, A. L. 1889; Kirk, T. W. 1890; La-brousse, C. 1894; Lallié, N. 1913; Lancaster, I. 1884, 1885, 1886a, b, c, d, 1891, 1893, 1909; Lancaster, F. W. 1909b; Langley, S. P. 1893; Le Conte, J. 1874; Legal, E. & Reichel, P. 1879-85, 1881; Lehmann, E. 1902; Lenden-feld, R. 1881-83, 1896, 1903, 1904, 1905; Le Page, W. L. 1923; Lesmüller, A. 1906; Lewis, E. 1874; Liais, E. 1861, 1866; Lilienthal, G. 1914, 1917, 1921; Lilienthal, O. 1893a, b, c, d, 1895, 1896; *Lorenz, K. 1933; Louvrié, C. 1866, 1868, 1878, 1880, 1884; Lucas, F. A. 1888b, 1894a; Lucy, L. 1869; Lull, R. S. 1906; MacGregor, J. G. 1889; *Magnan, A. 1913d, 1922; Mallock, A. 1911a; Marey, E. J. 1868, 1869a, b, 1870a, 1874a, b, 1875, 1882a, b, 1883, 1886, 1887a, b, c, d, e, f, g, h, 1888a, 1889a, b, 1891, 1893; Martin, L. 1862-63, 1888; Mentz, R. 1913; Middleton, H. 1883; Milla, K. 1908; Miller, R. C. 1924; Miller von Hauenfels, A. 1891; Monteil, S. 1875, 1876; Morénes, R. 1866; Müllenhoff, K. 1885b, 1891, *1894; Newberry, J. S. 1887-88; Nietsch, V. 1905; Nimführ, R. 1915; Nordmann, C. 1924; Oliver, J. E. 1889; *Olshausen, A. 1908; Parker, J. D. 1870; Pascal, G. 1899; Peal, S. E. 1891b, 1896; Pénaud, A. 1874; Pettigrew, J. B. 1867, 1869, 1870, 1872; Pickering, W. H. 1889; Planavergne, H. & Planavergne, L. 1874; Prochnow, O. 1912, 1922; Proctor, T. 1880; Pütter, A. 1914; Rankin, J. 1867; Rayleigh, B. 1883, 1889, 1900; Rémy, —. 1910; Richet, C. R. 1891; Richet, C. R. & Richet, C. R. Jr. 1909a; Roeper, O. 1895; Runge, C. 1922; Samuelson, A. 1896; Sanderval, A. O. 1886; Schenkling-Prévôt, C. 1895c; Schlotter, H. 1876; Schmidt, G. J. 1876; *Schneider, K. C. 1907; Seilkopf, H. 1922; Seux, E. 1907; *Silberschlag, J. E. 1781, 1785; Smyth, W. 1867; Soreau, R. 1898; Southwell, T. 1870; *Spiess, O. 1904; Steenbeck, —. 1892; Steffen, K. 1900; Strasser, H. 1874; Sutton, H. 1878; Sy, M. 1936; Szymanski, J. S. 1918; Tatin, V. 1876a, b, 1879, 1880, 1891; Taverne, L. 1926; Thouveny, L. 1908; Tresca, H. E. 1874; Trowbridge, W. P. 1888; Trowbridge, W. P. and others 1887; Tschan, A. 1889; Tydeman, G. F. 1911; Walcher, —. 1908; Walker, G. T. 1923, 1925; Ward, H. L. 1891; *Webb, J. S. 1869; Weber, L. 1897b; Webster, G. V. 1918; Weiss, G. 1870-71; Wilson-Barker, D. 1924; Wixon, H. H. 1905; Young, E. W. 1904; Anon. 1733a, 1869b, 1874b. Many species. Gröbbels, F. 1926a, c, *1928; Magnan, A. 1913d, *1922. Include birds. Louvrié, C. 1884; Marey, E. J. 1869c. Large terrestrial birds. Peal, S. E. 1889a, b. Oceanic birds. Spears, J. R. 1891; Wilson-Barker, D. 1891.
- Aquila*. Strasser, H. 1878, 1886. *Ciconia*. Lilienthal, O. 1896; Walker, O.

1899; Wieselsberger, C. 1913. *Columba*. Amans, P. C. 1914; Banet-Rivet, P. 1911; Collins, D. B. 1903; *Gilde-meister, M. 1910a; Jobard, J. B. 1851; Richet, C. R. 1909; Strasser, H. 1878, 1886. *Cypselus*. Gal, J. & Mingaud, G. 1903. *Cypselus apus*. Raspail, X. 1902. *Diomedea*. Dukes, T. A. 1911; Hutton, F. W. 1868-69, 1903; Idrac, P. 1924; Rayleigh, B. 1889; Sargent, H. 1881; Walkden, S. L. 1925; *Webb, J. S. 1869; Wieselsberger, C. 1913. *Diomedea exulans*. Knauth, K. 1890. *Falco*. Wieselsberger, C. 1913. Falconiformes. Exner, S. 1906; *Schneider, K. C. 1907. *Gymnogyps*. Wieselsberger, C. 1913. *Larus*. Brewster, W. 1912; Butterfield, W. C. 1896; Forbes, A. 1913; Headley, F. W. 1897; Hutton, F. W. 1872a; Idrac, P. 1913a; M., F. 1879; Mickel, T. E. 1910; Miller, R. C. 1923; Strasser, H. 1878, 1886; Wiechel, —. 1892; Wieselsberger, C. 1913. *Larus argentatus*. Strong, R. M. 1923a. *Larus dominicanus*. Hutton, F. W. 1873. *Perdix*. Jobard, J. B. 1851. Procellariiformes. *Gilde-meister, M. 1910a. *Spheniscus* & *Vultur*. Hermann, O. 1908a.

Adaptation in form of body. Amans, P. C. 1906, 1911b.

Adaptation in structure. Nordmann, C. 1923b. *Sula* [Moris] *bassana*. Culemann, H. W. 1929.

Air pressure. *Columba*. Magnan, A. & Girerd, H. 1935c; Marey, E. J. 1875.

Body movements in flight. Marey, E. J. 1870b.

Child lifting. *Aquila*. Anon. 1876b.

Clipped wings, flight with. *Columba*. Noques, P. & Richet, C. 1910.

Construction of artificial bird useless. Alix, H. E. 1875b.

Controversial discussion. Schneider, K. C. 1907.

Hovering. Airy, H. 1883a; Artingstall, F. D. 1873; Cunningham, D. 1883; Larden, W. 1883; Middlemiss, C. S. 1883; Rae, J. 1883; Tschusi zu Schmidhoffen, V. 1895; Wharton, H. T. 1883.

Inter-locking of primary wing feathers. Falconidae. Dean, B. 1905; Trowbridge, C. C. 1904, 1906; Trowbridge, W. P. 1887-91.

Mathematical analysis. Marey, E. J. 1869a.

Measurement of acceleration. Huguenard, E. & Magnan, A. 1927.

Measuring forces involved. Marey, E. J. 1887a.

Model. Hooke, R. 1679.

Molt of remiges and loss of flight. Hamonville, J. C. 1898b; Poncy, R. 1908a.

Safety devices in wings. Graham, R. R. 1930.

Specific gravity, alleged adjustment. Allis, T. 1844a.

Weights and measurements of flight mechanism. Harting, P. 1869.

ALIGHTING

General. Beetham, B. 1910-11.

Use of bastard wing in checking speed when alighting. *Ciconia* & *Columba*. Fisher, W. H. 1902.

ANATOMY INVOLVED IN FLIGHT

Books. Text in French. Barthez, P. J. 1798; Mouillard, L. P. 1881.

Text in German. Precht, J. J. 1846.

General. Amans, P. C. 1885; Coues, E. B. 1871b; Jovanowitsch, M. 1876; Künckel d'Herculais, J. 1909. *Aquila*. Strasser, H. 1878, 1886.

Popular account. Mickel, T. E. 1910.

CENTER OF GRAVITY

Experimental study. Zimmer, K. 1935b.

Mathematical study. Houssay, F. 1919.

Variation. Robin, C. P. 1878.

POSTURE IN FLIGHT

General. Headley, F. W. 1910b.

Head and feet. *Leptoptilus*. Jackson, F. J. 1912.

Legs and feet. *Biedermann, R. 1896; Hartert, E. J. 1894, 1895a, b; Hilgert, C. 1907; Holdsworth, E. W. 1895; Meade-Waldo, E. G. 1895, 1896. Many species. Barrett-Hamilton, G. E. 1895, 1903a; Townsend, C. W. 1909a. Rapacious birds. Kenessey von Kenese, L. 1894; Talský, J. 1895; Ziemer, E. 1893a, 1894, 1895. *Corvus cornix*. Homeyer, A. 1895. Falcones. Voigt, A. 1894b. *Otis tarda*. Pohl, R. 1919.

Peculiar posture. Heron flying with extended neck. *Ardea*. Denmead, T. 1927.

Posture of neck in locomotion. *Gallus*. Koppányi, T. & Kleitman, N. 1926.

ROWING FLIGHT

General. Breguet, L. 1924. *Columba*. Couvreur, E. & Chapeaux, M. 1926.

Difficulty in arising from ground. *Cypselus*. Bardy, H. 1901.

Graphic methods of recording flight. Poole, E. L. 1925.

Illustrations of bird in various stages of wing strokes. *Larus*. Marey, E. J. 1887c, d, e, f, g, 1888b, 1891.

Measurements of work done by flight muscles. Marey, E. J. 1871; Richet, C. R. 1891. *Larus*. Marey, E. J. 1887b.

Moving pictures of rowing flight. Grützner, P. 1910.

Organs of flight. See also under *Myology* and *Skeleton*. Gibbs, R. M. 1894. Books. Text in English. Allen, G. M. 1925. Text in French. Barthez, P. J. 1798; Mouillard, L. P. 1881. Text in German. Precht, J. J. 1846.

Power comparison of wing areas. Races of fowls. Chaîne, J. 1920a.

Power required in beginning flight. Marey, E. J. 1886.

Resistance of air. Marey, E. J. 1874a, b, 1875, 1887a.

Correlations

Power of flight with weights of

Lungs, heart, and flight muscles. Magnan, A. 1912k, n.

Pectoral muscles. Edwards, C. L. 1886.

Wing area with

Body weight. Many species. Magnan, A. 1913d, h.

Heart weight. Magnan, A. 1912j.

Pectoral muscle weight. Many species. Magnan, A. 1912j.

Strokes of wings

Curious upstroke. *Columba*. Headley, F. W. 1911.

Down stroke. Headley, F. W. 1908; Jourdain, F. C. 1908.

Frequency. Dwight, J. 1904; Stirling, W. 1911. Many species. Marey, E. J. 1870b.

Frequency of wing beat 21-51 times per second. Trochilidae. Stresemann, E. & Zimmer, K. 1932.

Inclination of wing surface at different stages in strokes. Marey, E. J. 1872.

Unequal strokes. Headley, F. W. 1910c.

STABILITY IN AIR

General. Louvrié, C. 1878.

Action of tail as stabilizer. Louvrié, C. 1880.

STEERING

Book. Text in English. Beetham, B. 1910-11.

General. Lucas, F. A. 1893a.

Separate control claimed for outer two tail feathers. *Gyps*. Jourdain, F. C. 1907b.

VELOCITY OF FLIGHT

Book. Text in English. Pycraft, W. P. 1922.

General. Baker, E. C. 1922c; Bank, H. 1901; Butterfield, W. C. 1895b; Chassérlaud, R. 1913; Clark, A. H. 1925; Cordeaux, J. 1895; Feilden, H. W. 1895; Frauenfeld, G. R. 1864a; Götz, W. H. 1926; Harting, J. E. 1895c; Hume, A. O. 1887; Knauer, F. K. 1911c; Lafond, E. J. 1907; Longstreet, R. J. 1930; Loos, C. 1907b; Lucas, F. A. 1906; Milla, K. 1895b; Pütter, A. 1914; Seemann, W. 1898; Southwell, T. 1870; Tegetmeier, W. B. 1892; Thienemann, J. 1910, 1911c; Weismann, F. L. 1878; White, F. B. 1927; Withington, H. 1893. Many species. Richard, A. 1910; Anon. 1899c. Migrating birds. Donald, C. H. 1923. Palearctic migrating birds. Meinertzhagen, R. 1921c.

Alcedo ispida. Böttger, O. 1899. Anatidae. Böttger, O. 1899, 1900; Clayton, H. H. 1897b. Anserinae. Clayton, H. H. 1897a. *Anthus*. Stubbs, F. J. 1913b. *Ardea*, *Buteo*, & *Cerchneis*. Wetmore, A. 1916b. *Charitonetta albeola*. Clark, H. L. 1893d. *Cinclus aquaticus*. Mathews, M. A. 1857. *Colaptes*. Gignoux, C. 1921a; Wetmore, A. 1916b. *Coloeus*. Loos, C. 1903. *Columba*. Böttger, O. 1897;

Gurney, J. H. Jr. 1922b; Harting, J. E. 1895d; Loos, C. 1903; Mégnin, P. 1898; Stubbs, F. J. 1913b; Winkler, T. C. 1886; Ziegler, H. E. 1897; Anon. 1896a. *Corvus*. Loos, C. 1903; Wetmore, A. 1916b. *Hirundinidae*. Defrance, J. L. 1824; Anon. 1896a. *Hirundo*. Böttger, O. 1897. *Hirundo rustica*. Wodzicki, K. & Wojtusiak, R. 1934. *Lanius* & *Otocoris*. Wetmore, A. 1916b.

Effects of cold. *Columba*. Paris, P. 1898.

Method of determining velocity and distance of flying bird. *Coloeus*, *Columba*, *Corvus*, *Lyrurus*, *Perdix*, *Pica*, *Picus*, & *Tringa*. Loos, C. 1903.

Velocity 28-82 miles per hour for racing pigeons. Rivière, B. B. 1922, 1923b.

Migrating birds

General. *Hirundo*. Milla, K. 1895b.

Migration at night. Lunar observations. Very, F. W. 1897.

WIND, RELATION TO FLIGHT

Book. Text in English. Headley, F. W. 1895b.

General. Headley, F. W. 1894, 1907b; Möbius, K. A. 1891; Western, R. W. 1893; Whitlock, F. B. 1897a. *Laridae*. Müllenhoff, K. 1891.

Flight against wind. Buturlin, S. A. 1910b, 1912. *Larus*. Hollis, W. A. 1910.

Intermittent wind. Marey, E. J. 1889a.

Sensitivity to wind. *Larus*. Maillefer, A. 1920.

Turbulent winds. Nordmann, C. 1923a.

Use of wind

In rising. Davidson, G. L. 1896.

Migrating birds. Stubbs, F. J. 1909d.

Vertical air currents used

General. *Cypselus*. Fossa-Mancini, E. 1920.

Assumed to be produced by ocean waves. Froude, R. E. 1889.

Solar heat producing rising air currents. Lilienthal, O. 1891.

Mode of flight when shot

Birds shot dead set their wings and sail gradually to the ground. Strode, W. S. 1887.

Towering. Rising sharply before falling. Kinahan, G. H. 1877; Millett, F. W. 1877; Southerland, A. 1877.

Physiology of flight

Book. Text in French. Marey, E. J. 1890.

General. Gröbbels, F. 1926c, *1928; Henry, C. L. 1878; Marey, E. J. 1875, 1887h.

EXPERIMENTAL STUDIES OF MECHANICS OF FLIGHT

General. Idrac, P. 1913b, 1921. *Diomedea*. Idrac, P. 1924, 1925b, 1926. *Vultures*. Idrac, P. 1925a.

Body-supporting surfaces. *Columba*. Clément, H. & Chapeaux, E. 1927.

Experimental air pressures, air compositions, and air temperatures. *Larus*, *Passer*, & *Tinnunculus*. *Lucanus, F. K. 1903.

Reflexes involved in steering. *Anas*, *Columba*, & *Gallus*. *Clementi, A. 1910, 1913.

Relation of paratympanic organ to flight. *Columba*. Benjamins, C. E. 1926b; Vitali, G. 1927.

Air pressures on wings

General. *Columba*. Magnan, A. & Girerd, H. 1935a, b.

Different form. Marey, E. J. 1900.

"Tumbling" of pigeons

General. Howes, G. B. 1901.

Origin of habit. Howes, G. B. 1901.

LAND LOCOMOTION

General. Miller, L. H. 1915. Young birds. *Gallinula chloropus*. Godfrey, R. 1898b.

Diving birds. *Colymbus*. Haigh, G. H. 1892; Shufeldt, R. W. 1898c. *Gavia*. Shufeldt, R. W. 1898c. *Podiceps*. Aplin, O. V. 1890; Finn, F. 1898a; Newton, A. 1889b. *Mergus*. Finn, F. 1898d. *Nettapus*. Finn, F. 1897. *Sula* [*Moris*] *bassana*. Cunningham, R. O. 1866.

Position assumed. *Spheniscidae*. Finn, F. 1898c.

Running speed. *Geococcyx*. Hunt, R. 1920a.

Walking erect. Schelhammer, G. C. 1691.

WATER LOCOMOTION

Diving

Book. Text in English. Dewar, J. M. 1924.

General. Blackwall, J. 1832; Csörgey, T. 1922-24; Forbush, E. H. 1922b; Witherby, H. F. 1913b.

Various birds. *Actitis macularia*. Mousley, W. H. 1920. *Anatidae*. Comeau, N. A. 1923. *Cinclus*. Ehinger, C. E. 1930; Elliott, J. S. 1894. *Clangula*. Robinson, H. W. 1913c. *Colymbidae*. Townsend, C. W. 1924a. *Gavia*. Comeau, N. A. 1923; Forbush, E. H. 1921; Kennard, F. H. 1923. *Gaviidae*. Townsend, C. W. 1924a. *Larus*. Cummings, S. G. 1913. *Opisthocomus*. Quelch, J. J. 1898-99a. *Sula* [Moris] *bassana*. Sutton, J. 1889.

Ability to keep body submerged. *Gallinula*. Atkinson, J. C. 1844.

Anatomy involved in diving. *Sula* [Moris] *bassana*. Culemann, H. W. 1929.

Effect of whirling motion of water on body and tail. Magnan, A. 1921a.

Foot use. Townsend, C. W. 1909c.

Periods of dives in relation to depth of water. Dewar, J. M. 1920b.

CHANGING SPECIFIC GRAVITY BY CONTRACTION OF

Air sacs, as oxygen reservoir. Csörgey, T. 1926b.

Feather muscles producing less bulk. Footitt, W. F. 1865; Stubbs, F. J. 1910b.

USE OF WINGS

General. Townsend, C. W. 1909c. *Phalacrocorax*. Salvin, F. H. 1891.

Does grebe spread wings just before diving? *Colymbus*. Burtch, V. 1914.

Swimming

General. Csörgey, T. 1922-24; Jacquemin, E. 1835c; Lucas, F. A. 1894a; Rich, W. H. 1929. Wading birds.

Cohen, D. A. 1894b. *Cinclus aquaticus*. Matthews, B. S. 1894. *Cinclus britannicus*. Tschusi zu Schmidhoffen, V. 1913. *Columba palumbus*. Macpherson, A. H. 1908. *Podiceps*. Frank, H. R. & Neu, W. 1929.

Partial submergence. Morris, B. R. 1862. *Mergus serrator*. Book. Text in English. Samuels, E. A. 1883.

Powers in swimming. Faber, F. 1822, 1824. *Cinclus*. Coburn, F. 1894.

SWIMMING UNDER WATER

General. Csörgey, T. 1922-24. *Alca*. Blyth, E. 1837b. *Anatidae*. Gloger, C. W. 1853b. *Cinclus aquaticus*. Kinahan, J. R. 1858. *Phalacrocoracidae*. Johnson, J. P. 1901; Meiklejohn, A. H. 1900b.

Only feet used. *Gavia*. Allen, W. E. 1920.

Unusual swimming. *Columba*. Landois, H. 1896a.

Wings used in swimming under water. Kelso, J. E. 1922.

LONGEVITY

Book. Text in English. *Colinus*. Stoddard, H. L. 1931.

Book. Text in French. Includes birds. Metchnikoff, E. 1907.

General. Bedford, M., Witherby, H. F., and others 1909; Butter, J. 1817-20; Flower, S. S. 1910; Günther, A. C. 1910; *Gurney, J. H. Jr. 1899b; Harris, J. A. & Boughton, D. C. 1928; Klawieter, A. 1901; Knappen, P. M. 1928b; Picchi, C. 1913. Many species. Oustalet, J. F. 1899. Include birds. Flower, S. S. 1926; Gill, T. N. 1899; Knauer, F. K. 1910. Birds of prey. Flower, S. S. 1923.

Anserinae. Landsborough, D. 1842. *Cardinalis*. Ganier, A. F. 1933b. *Carpodacus p. purpureus*. Magee, M. J. 1928a. *Columba*. Desportes, E. H. 1854. *Cracticus torquatus*. Anon. 1897c. *Cuculus*. Gurney, J. H. Jr. 1899a. *Dafila acuta tzitzihua*. Lincoln, F. C. 1927a, b. *Diomedea*. Meyer, A. B. 1887a; Rosenberg, C. B. 1887b. *Fringilla*. Knottnerus-Meyer, T. 1900. *Fuligula nyroca*. Gurney, J. H. 1851. *Gallus*. Schjelderup-Ebbe, T. 1924b. *Grus*. Astley, H. D. 1901. *Larus argentatus smithsonianus*. Nichols, J.

T. 1915. *Otis t. tarda*. St. Quintin, W. H. 1926a. *Passer*. Bianchi, V. 1907a. *Pelecanus*. Lönnberg, A. J. 1929b. *Poephila gouldiae*. Butler, A. G. 1902d. Psittaci. Cérati, G. 1752; Metchnikoff, E. 1902; Anon. 1865. *Pycnonotus*. Chinnery, I. 1901. *Richmondia*. Ganier, A. F. 1935. *Serinus flavi-ventris*. FitzSimons, F. W. 1908. *Spizella socialis* [*p. passerina*]. Howe, R. H. 1902. Strigidae. Grabham, O. 1897b. *Struthio*. Duerden, J. E. 1912a. *Turdus migratorius*. Howe, R. H. 1902. *Turtur*. Anon. 1901a. *Turtur ferrago*. Ruhenstroth, H. L. 1908.

Average age. Thurburn, A. 1908.

Longevity as index of constitutional fitness. *Gallus*. Pearl, R. 1923.

CAPTIVITY

General. Bonhote, J. L. 1910; Brown, C. E. 1928; Butler, A. G. 1910a, 1913; Fillmer, H. R. 1899; Hartley, E. A. 1899; Hensman, H. P. 1868; Meade-Waldo, E. G. 1899; Ménégau, H. A. 1914c; Schlacht, H. 1907. Many species. Günther, A. C. 1910.

In zoological gardens. Many species. Bolau, H. 1879; Schmidt, M. 1880.

EXCEPTIONAL RECORDS

Anas boscas (wild) 22 years. Gurney, J. H. 1875c.

Anser. 37 years, 9 months, 6 days. Anon. 1835b.

Aquila. 251 years claimed. Hašek, B. 1898.

Ciconia. Over 70 years. Rosenberg, C. B. 1887c.

Larus argentatus. In captivity 39 years. Ritchie, J. 1935. Observed 24 years. Mackay, G. H. 1894a.

Paroaria cucullata. 29 years and 3 months. Berg, C. 1897.

Psittacus. Over 100 years. White, W. H. 1836a.

Turdus. 25 years. Garvert, B. 1896.

LYMPHOID TISSUE AND ORGANS

See also under Circulatory system: Lymphatic system.

General. Kostarew, S. 1867. Many species. *Jolly, J. 1915. Includes

birds. Muthmann, E. 1913. *Alca*. Retterer, E. & Lelièvre, A. 1913b. *Anas*, *Anser*, & *Columba*. Jolly, J. 1908, 1909c, 1911a, g. *Cursores* & *Falconiformes*. Wenckelbach, K. F. 1896. *Gallus*. Jolly, J. 1908, 1909c, 1911a, g; Renaut, J. L. 1879; Stieda, C. H. 1880. *Pandion* & *Phalacrocorax*. Retterer, E. & Lelièvre, A. 1913b.

Effects of roentgen rays on lymphoid tissue. *Gallus*. *Unzeitig, H. 1912.

HEMOLYMPH NODES

General. Includes *Anser*, *Gallus bankiva*, & *Meleagris*. Vincent, S. & Harrison, H. S. 1897.

Distribution and histology. Includes birds. Lewis, T. 1903-04.

LYMPH NODES

Lymphoid tissue in birds is usually diffuse in the areolar connective tissue, according to *Dantschakoff, W. 1916d. However, some birds have lymph nodes.

General. *Jolly, J. 1908, 1909a, b, c, 1910a; Lauth, E. A. 1822; Magendie, F. 1819b; Manabe, S. 1930-31. *Anas*. Eberth, C. J. 1861; *Fürther, H. 1913; Retterer, E. 1902a, b. *Anser*. Eberth, C. J. 1861; Retterer, E. 1902b; Vialleton, L. & Fleury, G. 1901. *Cygnus*. Magendie, F. 1819c. *Gallus*. Eberth, C. J. 1861; Timofeevsky, D. I. 1898. *Meleagris*. Eberth, C. J. 1861.

Development. *Anas*. Jolly, J. 1909a. *Anser*. *Pensa, A. 1907a, b.

Esophageal lymph nodes. *Anas* & *Anser*. Glinsky, A. 1894.

Histology of lymph nodes. *Anser*. *Fleury, S. 1902; *Pensa, A. 1907a, b.

Tonsils. Many species. Rapp, W. L. 1843.

Intestinal lymph nodules

General. *Anas* & *Anser*. *Basslinger, J. 1854, 1858a. *Columba*. Cloetta, N. 1893. *Gallus*. Ciaccio, C. 1907. *Passer*. *Basslinger, J. 1854, 1858a.

Aggregated nodules (Peyer's patches). Retterer, E. & Lelièvre, A. 1913a. *Anser*. Retterer, E. & Lelièvre, A. 1910a. *Casuarus*. Lelièvre, A. & Retterer, E. 1910a. *Gallus*. Lelièvre, A. & Retterer, E. 1910a; Retterer, E. & Lelièvre, A. 1910a, c.

In ceca. Eberth, J. 1861.

LYMPHOID TISSUE IN

Bursa Fabricii. Jolly, J. 1911b, 1911g, 1913c. Many species. *Jolly, J. 1915. *Buteo*. Schumacher, S. 1903. *Columba*. Retterer, E. 1885b; Schumacher, S. 1903. *Cuculus*. Schumacher, S. 1903. *Cursores & Falconiformes*. Wenckelbach, K. F. 1896. *Gallus*. Jolly, J. 1911c; Retterer, E. 1885b; Schumacher, S. 1903. *Monedula & Otus*. Schumacher, S. 1903. *Uria*. Retterer, E. 1885b.

Auricular folds. *Meleagris & Tetrao*. Plate, L. H. 1918.

Diverticulum ilei (Meckel's diverticulum). Mitchell, P. C. 1901c, 1904.

SPLEEN

Books. Text in English. Owen, R. 1866-68.

Text in German. Many species. Gadow, H. F. 1891d; Müller, W. 1865.

General. *Columba*. Cuénot, L. 1889. *Corvus*. Mayer, A. F. 1832. Includes *Gallus*. Poso, O. 1906. *Passer*. Cuénot, L. 1889. *Rhinochaetes jubatus*. Marshall, W. A. 1870. *Struthio*. Mayer, A. F. 1832.

Development. *Acrocephalus*. Shikunami, J. 1920. *Anas*. Tonkov, V. N. 1899, 1900a. *Ardea*. Shikunami, J. 1920. *Columba*. *Woit, O. 1897. *Columbidae*. Retterer, E. & Neuville, H. 1917a. *Coturnix*, *Emberiza*, & *Gallinula*. Shikunami, J. 1920. *Gallus*. Dantschakoff, W. 1916b; Giannelli, L. 1909; Gray, H. 1852; Shikunami, J. 1920; Tonkov, V. N. 1899, 1900a; *Woit, O. 1897. Includes *Gallus*. Choronschitzky, B. J. 1900. *Lanius*, *Luscinia*, *Meleagris*, & *Nycticorax*. Shikunami, J. 1920. *Passer*. Shikunami, J. 1920; *Woit, O. 1897. *Turdus*. Shikunami, J. 1920.

Hemopoiesis in embryonic period. *Gallus*. Jolly, J. 1911d.

Measurements. Magnan, A. & La Riboisère, J. 1911.

Physiology. Birds incidental. Whiting, A. J. 1897.

Sex and seasonal differences in weight. *Streptopelia*. Riddle, O. 1928a.

Small accessory spleen. Includes *Anser*. Vincent, S. & Harrison, H. S. 1897.

Splenectomy, effects. *Columba*. Toruń, Y. 1930, 1931.

Structure

General. *Coccothraustes*, *Passer*, & *Turdus*. *Greschik, J. 1916b.

BLOOD VESSELS

Arteries. *Anas & Gallus*. Jolly, J. 1911f.

Schweigger-Seidel sheaths. Includes birds. Staemmler, M. 1925. *Coccothraustes*, *Passer*, & *Turdus*. *Greschik, J. 1916b.

HISTOLOGY

General. Many species. Timm, A. 1862. Include birds. Billroth, T. 1857; Hoyer, H. 1892, 1894. Birds incidental. Whiting, A. J. 1897.

Columba. Petrone, L. M. 1889a. *Columbidae*. Retterer, E. & Neuville, H. 1917a. *Falco*. Retterer, E. & Neuville, H. 1917b. *Gallus*. Ciaccio, C. 1907; Petrone, L. M. 1889a. *Haematopus & Struthio*. Retterer, E. & Neuville, H. 1917b.

Macrophages in tissue culture. *Gallus*. Rioch, D. M. 1923.

Reticular connective tissue. Histochemistry. Includes *Columba*. Lehrell, F. 1903.

MENINGES

Book. Text in English. Includes birds. Swedenborg, E. 1882.

General. *Malacarne*, V. 1782. *Columba & Gallus*. *Hansen-Pruss, O. C. 1923.

Development. *Anas*. Gelderen, C. 1924a, b; Sterzi, G. 1900-01, 1902. *Columba*. Livini, F. 1906a. *Gallus*. Livini, F. 1906a; Sterzi, G. 1900-01, 1902. Include *Gallus*. Harvey, S. C. & Burr, H. S. 1924, 1926. *Meleagris*. Sterzi, G. 1900-01, 1902. *Strix*. Sterzi, G. 1900-01, 1902. *Vanellus*. Gelderen, C. 1924a, b.

Histology. *Anas*. Sterzi, G. 1900-01, 1902. *Columba*. Livini, F. 1906a. *Gallus*. Livini, F. 1906a; Sterzi, G. 1900-01, 1902. *Meleagris & Strix*. Sterzi, G. 1900-01, 1902.

Pia mater. Includes birds. Stieda, C. H. 1869a.

Sinuses of dura. Gelderen, C. 1924c. Swedenborg, E. 1882.

CEREBRO-SPINAL FLUID

General. *Columba* & *Gallus*. Hansen-Pruss, O. C. 1923.

Apertures from fourth ventricle into subarachnoid space. Injection experiments to test existence. None found in embryos of 4 to 9 days. *Gallus*. Keegan, J. J. 1916-17.

Tela chorioidea. *Struthio*. Coupin, F. 1924.

CHOROID PLEXUS

General. Includes birds. Faivre, E. 1857; Loeffler, F. B. 1852. *Gallus*. Livini, F. 1905b, 1906b. *Struthio*. Coupin, F. 1924.

Development. *Columba* & *Gallus*. Livini, F. 1905b, 1906b.

Histology. *Anas*. Pellizzi, B. 1911. *Columba*. Livini, F. 1905b, 1906b; Pellizzi, B. 1911. *Gallus* & *Passer*. Pellizzi, B. 1911.

SPINAL MENINGES

General. *Dromaeus* [*Dromiceius*]. Hardesty, I. 1905. *Gallus* & *Passer montanum*. Shimada, Kichisaburo 1922. *Struthio*. *Streeter, G. L. 1904.

Ligamentum denticulatum. *Gallus* & *Passer montanum*. *Shimada, Kichisaburo 1922.

Variation. *Columba*. Peck, J. I. 1889b.

METHODS

See also under **Apparatus, Technic, and Poultry culture.**

Age, estimation of. *Gallus*. Cuénoud-Landolf, L. 1913. Reich, O. 1921. Book. Text in French. Dupont, M. 1893.

Altitude, determination of. Stresemann, E. 1917b.

Art methods. Book. Text in English. Seton, E. T. 1896.

Attracting birds. McAtee, W. L. 1914c, 1916d, 1917e, 1918a, e, 1929a.

Behavior and life history studies. *Melospiza*. Nice, M. M. 1930e.

Blinds for concealment of observer, use of. Book. Text in English. Abbott, C. G. 1911; Herrick, F. H. 1924b; Lodge, R. B. 1901; Newsome, J. E. 1926; Strong, R. M. 1914, 1917a.

Capture of flock by surprise of sleeping sentinel. *Sula* [*Moris*] *bassana*. Cunningham, R. O. 1866.

Care of bird collection. Wythe, M. W. 1929.

Curing of feather-eating habit. *Psittaci*. Schäff, E. A. 1902.

Decoying. *Ectopistes migratorius*. Anon. 1832a.

Diseased fowls should not be used in experimental work. Bushnell, L. D. & Hinshaw, W. R. 1927.

Dissection. Straus-Durckheim, H. 1843.

Field identification. *Anatidae*. Saunders, A. A. 1923; Townsend, C. W. 1923.

Field records. Book. Text in English. Chapman, F. M. 1912b.

Fishing. Use of domesticated *Phalacrocorax* by Chinese and Japanese. Laufer, B. 1931.

Heredity, study of. *Gallus*. Pearl, R. & Surface, F. M. 1909b.

Hunting. *Ectopistes migratorius*. Alexander, A. M. 1927.

Identification of skulls. O'Donoghue, C. H. 1913.

Maintaining fertility of eggs during long sea voyages. Morgan, E. 1927.

Measurement of skeleton. Many species. Blasius, W. 1885b.

Measuring feather elements. Juhn, M. & Fraps, R. M. 1934b.

Migration study. Cole, L. J. 1902; Weigold, H. 1912b.

Nesting activities, study of. *Haliaeetus leucocephalus*. Herrick, F. H. 1924a; Nice, M. M. 1930d.

Observations at lighthouse and lightships. Newton, A. 1880.

Preservation of egg albumen. Martin, S. 1871.

Protecting fruit by planting certain plants. McAtee, W. L. 1909.

Quantitative methods. Zedlitz, O. 1926.

Stomach contents, estimation of. McAtee, W. L. 1912d.

Terms for indicating the abundance or rarity of birds. McAtee, W. L. 1912f.

Testing eggs for fertility. Pennington, M. E., Jenkins, M. K., & Betts, H. M. 1918.

Van Dresser method for producing early and uniform molt. *Gallus*. Stewart, J. H. & Atwood, H. 1902d.

Weight determination of food digested daily. Taber, W. B. 1928.

BANDING

General. *Baldwin, S. P. 1931; Lincoln, F. C. 1921c, 1924c; Lincoln, F. C. & Baldwin, S. P. 1929; Musselman, T. E. 1925; Sprot, G. D. 1924. *Chaetura pelagica*. Stoddard, H. L. 1926a.

Recording repeating birds. Ken-deigh, S. C. & Baldwin, S. F. 1930; Law, J. E. 1923a.

Trapping for banding

General. Lincoln, F. C. 1927d. Anatidae. Lincoln, F. C. 1922c, 1926d.

Capture by fish nets. Anatidae. Lincoln, F. C. 1922b.

BREEDING

See also under **Poultry culture**.

Breeding waterfowl. McAtee, W. L. 1930a.

Propagation of game birds. McAtee, W. L. 1930b.

Recording experimental breeding operations. *Gallus*. Pearl, R. 1915d; Pearl, R. & Surface, F. N. 1900h, 1909a.

COLLECTING

Books. Text in English. Hornaday, W. T. 1891.

Text in German. Anon. 1896e.

General. Ridgway, R. 1891. *Ectopistes*. Alexander, A. M. 1927.

Capture of sea birds. Collins, J. W. 1884.

Catching gulls. Burchard, G. 1926.

Collecting and preparing eggs and nests of birds. Bendire, C. E. 1891.

DESTRUCTION OF BIRD PESTS

General. *Passer domesticus*. Dearborn, N. 1910; Osgood, F. 1899; Whitney, T. H. 1914.

PHOTOGRAPHY

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General. Gross, A. O. 1933; Parker, J. B. 1909; Turner, E. L. 1915.

Autochrome plates, use of. Overton, F. & Harper, F. 1913.

Indoor photography. Maw, A. J. 1932.

Outdoor photography. Book. Text in English. *Nesbit, W. 1926.

Shutter operation at a distance. Blind and electric connection. Lodge, R. B. 1901.

Cinematography

Analyzing movements of birds. Marey, E. J. 1882a, b, 1883.

Application to study of motions of birds' wings in flight. Marey, E. J. 1887c, d, e, f, g, 1888b, 1891, 1893.

Use in embryology. *Gallus*. Gräper, L. 1926, 1929a, b.

RECORDING

Flight. Graphic. Poole, E. L. 1925.

Migration records. *Stone, W. 1906b, 1908.

Notes and files. Wetmore, A. 1927a.

Bird calls

General. Moore, R. T. 1915; Rowan, W. 1924; Saunders, A. A. 1915; Strong, R. M. 1918a; Summers, E. 1916; Wheeler, W. C. & Nichols, J. T. 1924.

Strobophotography. Metfessel, M. 1934.

Study of bird sounds. Saunders, A. A. 1924b.

SEX IDENTIFICATION

Book. Text in English. Cage birds. Butler, A. G. 1907c.

General. Newly hatched birds. *Gallus*. Punnett, R. C. 1919; Yamaguchi[i], T. 1928.

At autopsy. Ménégau, H. A. 1910.

TELESCOPE, USE FOR OBSERVING FLYING BIRDS

General. Newton, A. 1876.

Altitude, determination of. Andrus, C. G. 1920; Bray, R. A. 1895; Tennant,

J. F. 1875. Migrating birds. Stebbins, J. 1906.

Size determination. Andrus, C. G. 1920.

Velocity measurement. Migrating birds. Stebbins, J. & Fath, E. A. 1906.

TRAPPING

Book. Text in Italian. Olina, G. P. 1684.

General. Haack, D. 1884; Magee, M. J. 1926b; Penard, T. E. & Penard, A. P. 1926. Game birds. Jackson, F. J. 1926. *Passer*. Hill, W. T. 1889; Kalmbach, E. R. 1930; Whitney, T. H. 1914. *Sula* [*Moris*] *bassana*. Cunningham, R. O. 1866.

Africa. Book. Text in English. Jackson, F. J. 1926.

Bird liming. Egypt. Bonhote, J. L. 1919.

Netting. Grinnell, J. 1925a.

Snaring. Arrighi-Griffoli, G. 1904. Birds of Paradise. Finsch, O. 1893.

MIGRATIONS

See also under **Banding**. For references to migrations of birds in the classics, including the Bible, see Forster, T. I. 1814; in old Greek and Roman literature, see Lenz, H. O. 1856 and Pischinger, A. 1904; in the Bible, see Frey, H. H. 1595. For eighteenth century references see Marschall, A. F. 1881.

Books. Text in English. Allen, G. M. 1925; Boulton, W. R. 1933; Chapman, F. M. 1912b; Cornish, C. J. 1896; Coward, T. A. 1912; *Dixon, C. 1897b; Johnston, I. H. 1923; Knowlton, F. H. 1909; Pycraft, W. P. 1910a; Roberts, F. 1703; Romanes, G. J. 1884; Thomson, A. L. 1926, 1936a, b; Thomson, J. A. 1923a; Wallace, A. R. 1876; Wetmore, A. 1926d, 1930b; Whitlock, F. B. 1897b. Anatidae. Phillips, J. C. 1922-26. Anon. 1817. Sphenisciformes. Antarctica. Levick, G. M. 1914.

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1929; Klein, J. T. 1760; Kobelt, W. 1902; Lenz, H. O. 1856; Lucanus, F. K. 1923a, 1925, 1929; Pischinger, A. 1904; Schneider, K. C. 1909; Tiedemann, F. 1810-14. Arctic region. Faber, F. 1825-26.

Text in Italian. San Vitali, F. Before 1801.

Text in Latin. Klein, J. T. 1750; Plinius, C. 1832-34.

General. Alexander, H. G. 1911, 1921, 1923; Allen, J. A. 1881b, 1896b, 1909; Angelini, G. 1897; Bank, H. 1903a, b; Barrington, D. 1772; Beal, F. E. 1886; Besserer, L. 1902; Borggreve, B. 1881; Braun, F. 1899c; Brewster, W. 1886b; Briggs, F. S. 1924; Butterfield, W. C. 1909; Catesby, M. 1748; Cecil, H. 1890; Cooke, W. 1915a; Derham, W. 1710; Dewitz, J. 1901; Donnelly, J. F. 1879; Eckmarck, C. D. 1757; Floericke, C. E. 1914; Frauenfeld, G. 1864a, b; Garlick, T. 1869; Godeheu de Riville, —. 1760; Harvie-Brown, J. A. 1885; Helms, O. 1910; Herman, O. 1905b, 1907b; Howard, H. E. 1920; Hugues, A. 1909; Jenner, E. 1824; Jones, L. 1904a; Lafond, E. J. 1907; Laidlaw, T. G. 1898; Lambert, E. 1797; Larionov, W. T. 1927; Linnaeus, C. 1781; McAtee, W. L. 1919a; Mattingley, A. H. 1906; *Mayr, E. W. & Meise, W. 1930; Müller, F. 1911; Nichols, J. T. 1926a; Noggler, J. 1911, 1913; Ogilvie-Grant, W. R. 1906b; Oustalet, J. F. 1892; Pycraft, W. P. 1915; Rabes, O. 1915; Rössler, E. 1907b; Schenk, J. 1903, 1906; Schiller-Tietz, N. 1912; Schlegel, H. 1828; *Stone, W. 1913a; Sushkin, P. P. 1900a; Thomson, A. L. 1921a, b; Tollenaar, D. 1922b; Tristram, H. B. 1893; Tschusi zu Schmidhoffen, V. 1909b; Vaughan, J. H. 1929; Viguier, C. 1882; Wachs, H. 1926; Weismann, F. L. 1878; Zedlitz, O. 1926; Anon. 1905, 1914b. Many species. Whittle, C. L. 1923. Palearctic birds. Boubier, M. 1919b. Sea birds. Wesemüller, A. 1917b. Imported species. *Eckhardt, W. R. 1921.

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H. 1930. *Macrodipteryx*. Chapin, J. P. 1916b.

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Madagascar. Lavauden, L. 1929.

Sahara Desert. Geyr von Schwepenburg, H. 1924a.

South Africa. Gunning, J. W. and others 1908; Hamilton, J. S. 1909; Selater, W. L. 1906.

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America

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NORTH AMERICA

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Northwest North America. Bowles, J. H. 1917b.

West Coast. Cooper, J. G. 1880.

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General. Kingston, A. G. 1898; Macoun, J. M. 1901; Macoun, J. & Macoun, J. M. 1909.

British Columbia. Swarth, H. S. 1926b.

Labrador. Lewis, H. F. 1925.

Mackenzie Valley. Cooke, W. W. 1915b.

Manitoba. Criddle, N. 1922; Seton, E. T. 1891.

New Brunswick. Chatham. Baxter, J. M. 1901.

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Lake Erie shore. Sim, R. J. 1904.

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Illinois. Chicago. Ferry, J. F. 1908. Special flight over Chicago

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Austria. Tratz, E. P. 1910.

British Isles. Jerdon, A. 1847. *Loxia*. Witherby, H. F. & Alexander, C. J. 1911; Witherby, H. F. and others 1927. England. Edwards, L. A. 1907; Forster, T. I. 1858. *Bombycilla*. Gurney, J. H. Jr. 1914d.

Germany. Homeyer, E. F. 1878. Helgoland. Stresemann, E. 1908. *Syrhaptes paradoxus*. Thienemann, J. 1909b.

Italy. *Loxia*. Cavazza, F. 1909; Damiani, G. 1909.

Switzerland. Goll, H. 1900.

Astur. Sutton, G. M. 1927b. *Bombycilla garrula*. Tschusi zu Schmidhoffen, V. 1906, 1911a, 1922; Warga, K. 1929a. *Chlidonias nigra surinamensis*. Phillips, C. L. 1913. *Dendroica coronata*. Whittle, C. L. 1922b. *Loxia*. Picchi, C. 1909; Skovgaard, P. 1929a, 1931a, b; Stralendorff, —. 1927; Tschusi zu Schmidhoffen, V. 1909c; Whitaker, J. I. 1910; Witherby, H. F. & Alexander, C. J. 1911. *Loxia bifasciata* & *L. leucoptera*. Selys-Longchamps, M. E. 1846. *Melanerpes erythrocephalus*. Ridgway, R. 1881. *Nucifraga caryocatactes*. Rydzewski, W. 1935. *Nucifraga caryocatactes macrorhynchus*. Tratz, E. P. 1914b, d. *Nyctea nyctea*. Sutton, G. M. 1927b. *Phylloscopus inornatus*. Weigold, H. 1924c. *Picoides arcticus*. Van Tyne, J. 1926. *Scolopax*. Blagovyeshchensky, S. 1910. *Syrnhaptes paradoxus*. Tschusi zu Schmidhoffen, V. 1908b, 1909d. *Uria lomvia*. Fleming, J. H. 1907.

Irregular migrations resulting from weather conditions. Germany. Eckardt, W. R. 1919c, d. Bad weather. *Larus*. Eifrig, C. W. 1902.

Movements westward during snow. Pearse, T. 1907. Europe. Ussher, R. J. 1907. British Isles. Edwards, L. A. 1907; Morris, R. 1907.

Partial migrations in British Isles. Duff, J. 1848.

Species normally in Asia sometimes invades western Europe in great numbers. *Syrnhaptes paradoxus*. Knauer, F. K. 1911b.

Unusual migrations

England. *Sturnus vulgaris*. Gurney, J. H. Jr. 1914e.

Finland. *Acanthis linaria*. Qvarnström, E. 1931.

NORTH AMERICA

General. Fleming, J. H. 1905. *Ectopistes migratorius*. Anon. 1858. *Uria lomvia*. Fleming, J. H. 1907.

Michigan. *Falco s. sparverius*. Smith, F. 1904.

Pennsylvania. *Gavia immer*. Redfield, A. C. 1910.

Unexpected abundance in New England. *Nyctea nyctea*. Deane, R. 1902.

Unusual spring migration. British Isles. *Sturnus vulgaris*. Gurney, J. H. Jr. 1914f.

LENGTH OR DISTANCE OF MIGRATION

General. Cooke, W. W. 1904c.

Continuous flight lasting more than two hours. Cox, P. 1889.

Correlation of length of migration with body proportions. Many species. Averill, C. K. 1920.

Distance per day. Götz, W. H. 1926.

Preparation for long flights. Thiene-mann, J. 1917.

Resting on water during migrations. Fowler, W. W. 1895.

LIGHTHOUSE AND TOWER OBSERVATIONS

General. Newton, A. 1880.

America

Bahama lighthouses. Bonhote, J. L. 1903a.

Bay of Fundy. Brewster, W. 1886b.

City Hall. Philadelphia. Slaughter, — & Baily, W. L. 1901-02.

Maine. Spinney, H. L. 1922.

Europe

General. Grabham, O. 1900.

British Isles. Clarke, W. E. 1896, 1900, 1902, 1903a, b, 1904b; Ogilvie-Grant, W. R. 1910e, 1911e, 1912d, 1914b; Patten, C. J. 1913b; Anon. 1884c. Books. Text in English. Barrington, R. M. 1900; Clarke, W. E. 1912b.

Denmark. Hørring, R. 1922; Winge, A. H. 1909.

Germany. Blasius, R. 1890, 1904; Hennicke, C. R. 1914; Pfannenschmid, E. 1891.

LIGHTSHIP OBSERVATIONS

British Isles. Clarke, W. E. 1896, 1900, 1902, 1903a, b, 1904b; Newton, A. 1880; Anon. 1884c. Books. Text in English. Barrington, R. M. 1900; Clarke, W. E. 1912b.

NOCTURNAL MIGRATIONS

General. Chapman, F. M. 1888; Libby, O. G. 1899; Stone, W. 1906a; Winkenwerder, H. A. 1902; Anon. 1881a.

British Isles. Ellison, A. 1891. England. Spencer, T. 1871. Ireland.

Barrington, R. M. 1914. Pennsylvania.
Baily, W. L. 1904.

Altitude of flight in nocturnal migrations. Carpenter, F. W. 1906a, 1907.

Are migrations of certain birds diurnal or nocturnal? Hirundinidae. Fløystrup, A. 1926. *Microtus a. apus*. Hennemann, W. 1905.

Winter nocturnal migrations. Coale, H. K. 1910.

PHYSIOLOGY OF MIGRATIONS

General. *Gröbbels, F. 1928, 1930; Haecker, V. 1916.

Emptiness of stomach at end of long migration flight due to rapidity of digestion. McAtee, W. L. 1905b.

Increase in size of gonads before migration to breeding range. Bergtold, W. H. 1926a.

Causes of migrations

Book. Text in German. Graeser, K. 1905.

General. Ballou, W. H. 1880b; Barrows, W. B. 1906; Bodnar, B. 1924; Braun, F. 1898b, 1900a, 1906b; Brewster, W. 1886b; Butterfield, W. C. 1905c; Cartwright, B. W. & Harrold, C. G. 1925; Cooke, W. W. 1904a, c; Drost, R. 1926c, 1928; Eckardt, W. R. 1909, 1910a, b, 1913a; *Geyr von Schweppenburg, H. 1922; Götz, W. H. 1925a, 1926; *Grinnell, J. 1931; *Gröbbels, F. 1928; Herman, O. 1905a, 1907a; Hoffmann, J. 1901; Hough, F. B. 1864; Knauer, F. K. 1906a, 1908, 1911a; Leopold, N. F. 1923; Loomis, L. M. 1894; *Lucanus, F. K. 1922; Martorelli, G. 1892; Maynard, C. J. 1896b; Mayr, E. W. & Meise, W. 1930; Schürer, J. 1905; Schuster, W. 1909a; Serres, P. M. 1842; Stubbs, F. J. 1912a; Tristram, H. B. 1893; Vine, J. 1890; Walter, H. E. 1908; Weigold, H. 1912b, 1924b. Hirundinidae. La Harpe, J. 1864.

Abundance and distribution. Nichols, J. T. 1918.

Breeding instinct. Book. Text in German. Fischer, J. 1913.

Change of season. Pittet, L. 1910.

Cold and starvation. Cathelin, F. 1918.

Greater length of day in higher latitudes. Savage-English, T. M. 1923.

Internal rhythm. Moreau, R. E. 1931.

Photoperiodism. Eifrig, C. W. 1924; Rowan, W. 1926b; Thomson, A. L. 1924c.

Spermatogenesis. *Calidris arenaria*. Patten, C. J. 1911b.

EXPERIMENTAL STUDIES

General. Buturlin, S. A. 1910a; Massat, E. 1910; Schenk, J. 1911. *Larus*. Wachs, H. 1922a.

Abolishment of migratory instinct. Injection of castrated birds with male human urine. *Corvus*. *Rowan, W. 1932.

Castration, effects of. *Corvus*. *Rowan, W. 1932. *Larus*. Putzig, P. 1937.

Food supply, effects of. Stevenson, J. 1933.

Geographical location. Affects time of autumn migration urge. *Sylvia communis*. Wagner, H. O. & Schildmacher, H. 1937.

Injection of placental extract, effects of. *Rowan, W. 1932.

Low temperature, effects of. *Turdus p. philomelos*. Siivonen, L. & Palmgren, P. 1936.

Restriction of migration impulse by use of female sex hormone. Giersberg, H. & Stadie, R. 1934.

Sex hormone, effects of. Schildmacher, H. 1933, 1934.

LIGHT EFFECTS

General. Herman, O. 1907a; Schäfer, E. A. 1907. Includes birds. *Rowan, W. 1926b.

Gonad changes. *Rowan, W. 1925c, 1928, 1929, 1930, 1932. Book. Text in English. Rowan, W. 1931.

Relation of light periodicity. *Zenaidura*. Cole, L. J. 1933.

Artificial light

General. *Corvus*. *Rowan, W. 1932. *Erithacus rubecula*. Schildmacher, H. 1937b.

Electric lights in aviaries. Rowan, W. 1928, 1929, 1930, 1932. Book. Text in English. Rowan, W. 1931.

Origin of migration habits or instinct

Book. Text in German. Eckardt, W. R. 1910b.

General. Adams, C. C. 1905; Allen, J. A. 1880b; Ballou, W. H. 1880b; Blanford, W. T. 1886; Braun, F. 1911a; Chapman, F. M. 1894; Cooke, W. W. 1915a; Eckardt, W. R. 1909, 1910a, 1913a, 1918b, 1919b, 1921; *Ekman, S. 1912; *Geyr von Schweppenburg, H. 1922; Herman, O. 1905a; Mayr, E. W. & Meise, W. 1930; Pittet, L. 1908a; Taverner, P. A. 1904b.

Polar. Tristram, H. B. 1887.

Return to same locality

General. Lucanus, F. K. 1919b; Jenner, E. 1826; Taylor, F. C. 1886.

Return to Massachusetts. *Nettion creca*. Phillips, J. C. 1911.

ROUTES

Book. Text in German. Many species. Palmén, J. A. 1876.

General. Darwin, H. 1913; Geyr von Schweppenburg, H. 1929; Lampert, A. 1914; Müller, K. & Müller, A. 1903; Stejneger, L. H. 1905. Many species. Palmén, J. A. 1879.

Ardea cinerea. Skovgaard, P. 1925d. *Ciconia*. Eckardt, W. R. 1925b; Thienemann, J. 1909f, 1910. *Ciconia alba*. Skovgaard, P. 1926b. *Dendroica kirlandi*. Adams, C. C. 1904.

America. Cooke, W. W. 1904c, 1905a; Mackay, G. H. 1893b.

Light tower, influence on routes. Weigold, H. 1923-24.

North America to Chile. *Hirundo*. Philippi, R. A. 1898.

Old World

General. Hartert, E. J. 1913; Lucanus, F. K. 1922, 1924.

Across Mediterranean Sea. Headley, F. W. 1910a.

EUROPE

General. Bretscher, K. 1914b; *Weigold, H. 1913c, 1924a; Whitlock, F. B. 1891.

England to Transvaal. *Hirundinidae*. Witherby, H. F. 1920b.

Germany. Book. Text in German. Graeser, K. 1905.

North Sea. Verwey, J. 1922a.

Russia. *Menzbir, M. A. 1886.

Strait of Bosphorus. Alléon, A. 1869; Steinfatt, O. 1932.

Switzerland. Bretscher, K. 1915d.

World War, effects of. Larsen, W. P. 1917.

Sea migrations

General. Murphy, R. C. 1915b; Quednau, W. & Bahr, K. 1932. *Cygnus*. Reinsch, F. K. 1926.

Relation to oceanic currents. Pelagic birds. Brooks, S. C. 1934.

BIRDS SEEN AT SEA

Between London and Port Said. Magrath, H. A. 1911.

Malta to Morea, Greece. Thompson, W. 1842.

Mid-Atlantic. *Plectrophenax*. Butler, A. L. 1904.

SEASONAL MIGRATIONS

Autumn migrations

Book. Text in English. *Hirundinidae*. Anon. 1817.

General. Turner, E. L. 1926. *Chelidon r. rustica*. Marek, M. 1912. *Compsothlypidae*. Wood, J. C. 1907. *Falcones*. Ferguson, A. L. & Ferguson, H. L. 1922. *Hirundinidae*. Switzerland. Daut, K. 1905. *Micropus a. apus*. Küewzi, W. 1927.

Scarcity of adult birds in autumn. North America. Beckham, C. W. 1887.

AMERICA

Point Pelee, Ontario. Wood, N. A. 1910.

United States

Arizona. Swarth, H. S. 1908.

Connecticut. Direction of flight. Bishop, L. B. 1905a.

New Jersey coast. Urner, C. A. 1929, 1930.

Pennsylvania. *Falcones*. Broun, M. 1935.

EUROPE

British Isles

General. Cordeaux, J. 1877b, 1878a, c, 1879; Rivière, B. B. 1914.

England. Cordeaux, J. 1892a; Haigh-Lumby, A. 1901. Holy Island. Witherby, H. F. 1912c. Scott Head. Turner, E. L. 1926.

Ireland. Witherby, H. F. 1912b.

Scotland. Boase, H. 1927a, b; Service, R. 1896.

France

General. Schuster, L. 1920.

Germany

General. Bertram, K. 1905; Beserer, L. 1904, 1905a; Böker, H. 1916; Hofstetter, C. 1906-08; Thienemann, J. 1909a, 1927.

Spring migrations

AMERICA

Canada. Great Slave Lake. Wheeler, D. E. 1912.

Eastern North America. Eaton, E. H. 1904.

Michigan. Tinker, A. D. 1911.

Pennsylvania. Burns, F. L. 1901b.

Texas. Simmons, G. F. 1914.

EUROPE

General. Blasius, R. 1894; Floericke, C. E. 1899.

British Isles. Cordeaux, J. 1878b; "Correspondant" 1833; Gunning, J. W. 1908; Selby, P. J. 1849.

England. Cordeaux, J. 1877c, 1899. Wading birds. Cordeaux, J. 1881b.

Finland. West Coast. Hortling, I. J. 1929b.

Germany. Braun, M. 1906; Dobbrick, L. 1908a; Lorenz, L. & Moritz, S. 1913.

Hungary. *Vezényi, A. 1902. *Chelidon r. rustica*. Gaal de Gyula, G. 1902.

Island of Cyprus. Wilson, G. F. 1925.

Italy. Tucker, B. W. & van Oordt, G. J. 1929.

Russia. *Ciconia*. Browner, A. A. 1916.

SEX DIFFERENCES IN MIGRATIONS

General. *Anas p. platyrhynchos*. Leopold, A. 1919. *Sturnus vulgaris*. Helm, F. 1903, 1904.

Sex ratio in relation to seasons. Larionov, W. T. 1927.

SPEED OR RATE OF MIGRATIONS

General. Cooke, W. W. 1904c, 1915b; Cordeaux, J. 1895; Helm, A. F. 1900; Lafond, E. J. 1907; Lampert, A. 1914; Milla, K. 1895b; Patten, C. J. 1915; Stebbins, J. & Fath, E. A. 1906. *Anthus* & *Columba*. Stubbs, F. J. 1913b. *Corvidae*. Radig, K. 1926. *Motacilla*. Bank, H. 1902.

WEATHER, EFFECTS ON MIGRATION

General. A., R. 1879; Avezou, C. 1879; Bjerkander, C. 1776; Bretscher, K. 1918b; Cooke, W. W. 1911, 1913c; Eckardt, W. R. 1913b; Graeser, K. 1907b; Grundtvig, F. L. 1895; Hegyfoky, J. 1905b, c, d, 1906a, b, c, 1907a, b, 1908a, b, 1910, 1911, 1913a, b, 1916; Hiltmann, —. 1879; Lucanus, F. K. 1907a; Marek, M. 1906; Mostovenko, Z. F. 1913; Reichenow, A. 1879; Rohweder, J. 1879a, b; Smith, F. 1917; Weigold, H. 1924b.

Europe

General. Marek, M. 1902a.

Germany. Gallenkamp, W. 1906b; Tschusi zu Schmidhoffen, V. 1881.

Switzerland. Bretscher, K. 1915c.

Ciconia. Eckardt, W. R. 1925b. *Delichon u. urbica*. Hegyfoky, J. 1900. *Falcones*. Trowbridge, C. C. 1895. *Scolopax rusticola*. Pittet, L. 1920, 1921.

Length of migration. Eifrig, C. W. 1908.

Time of arrival in spring. Defant, A. 1910.

Seasonal weather, effects

Autumn. *Scolopax rusticola*. Weigold, H. 1924b.

Warm winter. Murdoch, J. 1878.

Severe weather, effects

General. Anon. 1899a. America.
Hancock, J. L. 1888a. Germany.
Klippert, G. H. 1879; Troller, J. 1913.

Reversal of migration. Hänish, R.
1899; Quistorp, G. 1879; Sachse, C.
1881.

STORMS

General. Hagerup, A. T. 1905.

Bird driven to shore by storm.
Anon. 1896c.

Birds carried up in sky by tornadoes.
Faye, H. 1896.

Spring storm in British Isles. Elli-
son, A. 1909.

Wind effects

General. Jahn, W. 1899; Lucanus,
F. K. 1907a; Marek, M. 1906, 1908;
Quistorp, G. 1882; Raspail, X. 1896c;
Stubbs, F. J. 1909d; Thomson, A. L.
1914; Trowbridge, C. C. 1902; Wei-
gold, H. 1913c; Whitlock, F. B. 1897a.
Laridae. Gurney, J. H. Jr. 1895.

Warm wind. Haecker, V. 1904c,
1924.

Westerly winds. England. Gurney,
J. H. Jr. 1895.

Wind from Alpine valleys. Bretscher,
K. 1915b.

MISCELLANEOUS TOPICS

Accounts of ornithological expedi-
tions by the author. Book. Text in
English. Chapman, F. M. 1933.

Aesthetic value of birds. Altum,
B. 1890c.

Age indication. Flight feathers.
Dendragapus. van Rossem, A. J. 1925.

Art in ornithology. Seton, E. T.
1896; Sutton, G. M. 1933.

Bird's nest in fleece of a living sheep.
Alleged. No eggs. *Acanthis*. Gurney,
J. H. 1875a.

Birds of prey as natural monuments.
Book. Text in German. Bräss, M.
1912b.

Criticism of anthropomorphic writ-
ing. Lucas, F. A. 1900b.

Effects of eggs on production of
saliva in man. *Gallus*. Roger, H. 1908.

Field identification of Anatidae.
Griscom, L. 1922.

"Fishy" taste of flesh of some species
not due to fish. McAtee, W. L. 1918c,
1919b.

Meteorological use of observations
of bird behavior in predicting weather.
Brehm, C. L. 1848.

Mummy birds in Egypt. Adams,
A. L. 1864b; Lortet, L. & Gaillard, C.
1901, 1907.

Odor of flesh. *Opisthocomus*. Beebe,
C. W. 1909b.

Perching. Douglas, J. C. 1881. In
trees. *Larus*. Finn, F. 1892b.

Personal experiences with various
American ornithologists. Book. Text
in English. Chapman, F. M. 1933.

Rock scratches by feet in walking.
Sphenisciformes. Vallentin, R. 1905.

Space sense. *Columba*. Cyon, E.
1900b.

Use of birds or material from birds
in therapy of ancients. Arndt, W. 1925.

Visibility. At what distance are
flying birds visible to the unaided eye.
Helm, A. F. 1902.

Weather forecasting. *Anser*. Bux-
baum, L. 1891.

Weight of excreta in 24 hours. Dann,
A. B. 1923.

LUMINOSITY

Alleged luminosity of some birds at
night, especially species of Ardeidae;
usually ascribed to phosphorescence.

General. Denise, L. 1910; Feller, J.
1672; Killermann, —. 1905; Schuster,
W. 1905b; Vogel, C. 1672. *Ardea*.
McIlwraith, T. 1861; Wyman, L.
1874. Ardeidae. Beardslee, L. 1874.
Strix flammea. Purdy, R. J. 1908.

Luminous eggs. *Gallus*. Paullin,
C. F. 1688b.

Luminous nests. Killermann, —.
1905.

Due to phosphorescent

Bacteria. Ternier, L. 1910.

Fungi. Sibour, L. 1913.

SENILITY

General. Psittaci. Metchnikoff, E.
1902.

Effects on thymus gland. *Gallus*. Terni, T. 1927b.

VITALITY OR TENACITY OF LIFE

General. *Carine*. Kunstler, J. 1907b. *Ciconia*. Dušek, I. 1888.

Strangled and frozen, yet lived 14 days. *Diomedea*. Perry, J. & Reed, W. J. 1900.

MOLT

See also under **Feathers, Integument, and Plumage.**

Books. Text in English. Chapman, F. M. 1912b.

Text in German. Gadow, H. 1891c; Lucanus, F. K. 1925; Naumann, J. F. 1905. *Gallus*. Maurer, F. 1895.

General. Acloque, A. 1909; Bartels, M. K. 1888; Blyth, E. 1836, 1837c; Böck, —. 1853; Bonhote, J. L. 1900c; Brehm, C. L. 1853c, 1857b; Dwight, J. 1902b; Geoffroy Saint-Hilaire, I. 1841; Gloger, C. W. 1829a; Gundlach, J. C. 1891; Haskins, C. H. 1921; Heinroth, O. 1898a, b, 1910b, 1917a, 1922; Homeyer, E. F. 1853; Ord, G. 1830; Oustalet, J. F. 1892; Palmer, W. 1896b; Samuel, S. 1870; Schiller-Tietz, N. 1902; Shufeldt, R. W. 1896; *Stone, W. 1896, 1900; Wagner, P. 1898b. Many species. Friedmann, H. 1930b; Martin, B. W. 1902; Müller, J. W. 1855. Cage birds. Müller, K. 1878. Capons. Schiller-Tietz, N. 1902. Diurnal birds of prey. Goodchild, J. G. 1892.

California. Santa Barbara Islands. Howell, A. B. 1917.

Macedonia. Book. Text in German. Stresemann, E. 1920.

Mexico. Lower California. Los Coronados Island. Howell, A. B. 1917.

Scotland. Ticehurst, C. B. 1916.

Accipiter gularis. Rothschild, L. W. 1913d. *Agelaius p. phoeniceus*. Allen, A. A. 1914b. *Alaudidae*. Witherby, H. F. 1916a. *Alca*. Homeyer, E. F. 1864a; Swenander, G. 1904a. *Alca torda*. Petit, L. 1898; Verwey, J. 1924. *Alectoris*. Gengler, J. 1921. *Anas*. Homeyer, E. F. 1864a; Poncey, R. 1909; Rogeron, G. 1886. *Anatidae*. Fatio, V. 1901; Jackson, A. C. 1915; Witherby,

H. F. 1917a. *Aptenodytes*. *Ewart, J. C. & MacKenzie, D. 1917. *Aptenodytes pennanti*. Seth-Smith, D. 1912b; Winton, W. E. 1898, 1899. *Buteo p. platypterus*. Burns, F. L. 1911. *Calidris*. Verwey, J. 1930. *Calidris arenaria*. Stone, W. 1898b. *Caprimulgus europaeus*. Heinroth, O. 1909a. *Charadriidae*. Kuroda, N. 1921. *Ciconia*. Eckstein, K. 1899. *Ciconiiformes*. Jackson, A. C. 1917–19, 1918b. *Circus*. Chiquet, —. 1924. *Coccothraustes vespertina*. Shufeldt, R. W. 1890c. *Colymbus*. Verwey, J. 1924. *Colymbus glacialis*. Bonhote, J. L. 1900a. *Conurus carolinensis*. Nie-meier, W. 1867. *Corvus f. frugilegus*. Laubmann, A. 1922; Witherby, H. F. 1913c, e. *Crex*. Bonhote, J. L. 1900b. *Cyrtonyx*. Swarth, H. S. 1909. *Eudyples arcticus*. Böck, —. 1865. *Eudyples chrysocome*. Wohlaue, E. 1902. *Falco*. Donner, E. 1907. *Falco eleonorae*. Heinroth, O. 1899. *Gallinae*. Gabriel, —. 1902. *Gallinula*. Bonhote, J. L. 1914a; Grant, C. H. 1914. *Gallinula porzana*. Floericke, C. E. 1890a. *Gallus*. Gilbert, A. G. 1905, 1906; Goodale, H. D. 1918c. *Garrulus*. Niederreiter, A. 1892. *Gavia*. Beebe, C. W. 1907c. *Geothlypis*. Palmer, W. 1900. *Grus*. Heinroth, O. 1903b. *Gymnorhina*. Degen, E. 1903. *Halcyon*. Laubmann, A. 1923. *Harelda glacialis*. Homeyer, E. F. 1876b. *Hesperiphona*. Magee, M. J. 1928b. *Hirundo*. Dwight, J. 1901a. *Lagopus*. Gloger, C. W. 1856f; Goebel, H. 1873b; Grinnell, J. 1900. *Lanius*. Miller, A. H. 1931. *Lanius ludovicianus*. Miller, A. H. 1928. *Laridae*. Dwight, J. 1901b. *Larus*. Homeyer, E. F. 1857; Rintoul, L. J. & Baxter, E. V. 1915. *Larus argentatus*. Ramsay, L. N. 1913. *Larus atricilla*. Beebe, C. W. 1906d. *Larus canus* & *L. melanocephalus*. Ninni, A. P. 1883. *Larus ridibundus*. Evans, W. 1915; Rintoul, L. J. & Baxter, E. V. 1915. *Limicolae*. *Dwight, J. 1900a. *Malurus*. Campbell, A. G. 1906; Dove, H. S. 1923a. *Malurus gouldi*. Littler, F. M. 1910b. *Motacilla*. Homeyer, E. F. 1857. *Oidemia*. Verwey, J. 1922b. *Otis*. Chapman, A. 1910. *Paradisea*. Bartlett, A. D. 1887; Rothschild, L. W. 1913d. *Paradisea apoda*. Sányál, R. B. 1895. *Paradoxornithinae*. Stresemann, E. 1923g. *Passeres*. *Dwight, J. 1900d; Witherby, H. F. 1915a, 1929. *Passerina*.

Stone, W. 1893b. *Passerina ciris*.
 Rüdiger, E. 1889. Pelecanoididae.
 Murphy, R. C. & Harper, F. 1921.
Phainopepla nitens. Miller, A. H. 1933.
 Phasianidae. Beebe, C. W. 1914d.
Phasianus. Altum, B. 1891a; Thomas,
 R. H. 1914. *Phoenicurus ochrurus*
gibraltariensis. Ticehurst, C. B. 1913.
 Picidae. Heinroth, O. 1916. *Pinicola*.
 Knight, O. W. 1896. *Piranga*. Stone,
 W. 1893b. *Platypus niger*. Böck,—
 1854. *Plectrophenax n. nivalis*. Wayne,
 A. T. 1906. *Plotus*. Heinroth, O.
 1903b. *Plotus melanogaster*. Sinclair,
 W. F. 1899. *Serinus*. Falss, E. 1902b.
 Spheniscidae. Bartlett, A. D. 1879;
 Pycraft, W. P. 1907g. *Spheniscus*.
 Gillespie, T. H. 1923. *Spinus pinus*.
 Dwight, J. 1901a. Stone, W. 1897.
Sporaeeginthus. Page, W. T. 1899.
Sterna. Brehm, C. L. 1854b; Clarke,
 W. E. 1907. *Sturnus vulgaris*. Peters,
 J. L. 1929a. Tetraonidae. *Dwight,
 J. 1900b. *Uria*. Homeyer, E. F.
 1864a; Swenander, G. 1904a. *Uria*
troile. Petit, L. 1898. *Verwey, J.
 1922c, 1924. *Vireo*. Dwight, J. 1897.
Zamelodia [*Hedymeles*] *ludoviciana*.
 Stone, W. 1893b. *Zonotrichia querula*.
 Nice, M. M. 1929b.

Autumn molt relation to age.
 Schwartz, L. H. 1919.

Continuity of nestling down and
 definitive feathers. Jones, L. 1907b;
 Rice, J. E., Nixon, C., & Rogers, C. A.
 1908. *Columba*. Jackson, A. C. 1913a.
Turtur [*Streptopelia*]. Strong, R. M.
 1902a.

Diet. Effect on molt. Plante, J. B.
 1904.

Effect on egg production. Rice,
 J. E., Nixon, C., & Rogers, C. A. 1908.

Environmental effects. *Alauda* &
Mergus. Cerva, F. 1920.

Head feathers. *Corvus f. frugilegus*.
 Witherby, H. F. 1913c, e.

Season, age, and sex. Many species.
 Heinroth, O. 1917a.

ABNORMAL MOLTING

General. Anatidae & *Lyrurus tetrax*.
 Taczanowski, W. 1884. Long-tailed
 Japanese fowls. Cunningham, J. T.
 1901, 1903.

Due to injury or disease. Heinroth,
 O. 1903a.

Loss of feathers without replacement.
Psittacus. Heusinger, K. F. 1877a.

Postponed molt. Beebe, C. W.
 1914b.

COLD, EFFECT ON MOLT

General. Phillips, J. C. 1914b.

In winter. Rintoul, L. J. & Baxter,
 E. V. 1916.

Irregular in winter. *Coccothraustes*.
 Harvie-Brown, J. A. 1880.

EXPERIMENTAL STUDIES OF MOLT

Feeding thyroid gland. Kuhn, O.
 1929. *Columba*. Blasi, D. 1925;
 Kříženecky, J. 1928c. *Gallus*. Blasi,
 D. 1925; Cole, L. J. & Hutt, F. B.
 1927-28; Horning, B. & Torrey, H. B.
 1923. Torrey, H. B. & Horning, B.
 1925a, b; Vallbort, G. & Walkowa,
 A. 1925.

Molt induced by pulling feathers and
 causing coloration between that of
 third juvenal plumage and adult.
Plotus. Heinroth, O. 1900b.

Production of early and uniform
 molt. *Gallus*. Stewart, J. H. & Atwood,
 H. 1902d.

FLIGHT FEATHERS

General. Gerbe, Z. 1875, 1877.
 Anatidae. Harting, J. E. 1886b. Div-
 ing birds. Farren, W. 1899.

Rectrices. Cretté de Palluel, A.
 1886; Jäckel, A. J. 1861. *Lagopus*
mutus. Ogilvie-Grant, W. R. 1911d.

Remiges. Cretté de Palluel, A. 1886.
 Alcedinidae. Stresemann, E. 1921c.
Halcyon. Laubmann, A. 1923. *Larus*
ridibundus. Poncy, R. 1908a.

Gradual molt so that flight feathers
 are not all missing at one time

General. *Anseranas*. Blaauw, F. E.
 1898. Laridae. Dwight, J. 1925.
 Passeriformes. Dwight, J. 1900d.

Molt of rectrices, one feather at a
 time. *Rhinoplax vigil*. Wetmore, A.
 1915a.

Rate of wing molt. *Gallus*. Acker-
 son, C. W., Blish, M. J., & Mussehl,
 F. E. 1928c.

Winter molt. Rintoul, L. J. & Bax-
 ter, E. V. 1916. *Coccothraustes*. Harvie-
 Brown, J. A. 1880.

Simultaneous loss of primaries

See also under **Plumage**: Eclipse plumage.

General. *Gavia*. May, J. B. 1930.

Loss of ability to fly during molt.
Many species. Hamonville, J. C. 1898b.

RELATIONS OF MOLT TO

Color change. Stone, W. 1901a.
Fringillidae. Hessler, A. 1854c.

Migration. Götz, W. H. 1925a.
Many species. Martorelli, G. 1892.
Passeriformes. Rintoul, L. J. & Baxter, E. V. 1914.

STRUCTURES OTHER THAN FEATHERS

Beak covering. Alcidae. Bureau, L. 1878a; Ridgway, R. 1880. *Carine*. Tavistock, H. 1917b. *Eudytes*. Mulvany, R. N. 1880. *Fratercula*. Bureau, L. 1877a; Harting, J. E. 1878. *Mormonidae*. Bureau, L. 1879; Coues, E. B. 1880b. *Simorhynchus*. Bureau, L. 1878b.

Palpebral ornaments. *Fratercula*. Bureau, L. 1877a; Harting, J. E. 1878.

Stomach lining. See also under **Alimentary canal**: Stomach. *Hydrocorax* Curl, H. C. 1911.

Claws, molt of

General. *Bonasa* & *Coturnix*. Stejneger, L. H. 1884b. *Lagopus*. Drew, F. M. 1884; Stejneger, L. H. 1884b. *Lyrurus*. Stejneger, L. H. 1884b. *Tetrao*. Bonsdorff, E. J. 1862. *Tetraonidae*. Stejneger, L. H. 1884b, 1887b. *Urogallus*. Stejneger, L. H. 1884b.

MORTALITY

See also under **Accidents and Pathology**.

Books. Text in English. American waterfowl. Phillips, J. C. & Lincoln, F. C. 1930. *Colinus*. Stoddard, H. L. 1931.

General. Gross, A. O. 1928; Shufeldt, R. W. 1893f; Surface, H. A. 1908; Urban, W. S. 1903b. Many species. Lincoln, F. C. 1931. American game birds. Henshaw, H. W. 1915. Insectivorous birds in France. Clarté, M. J. 1892. Waterfowl near Salt Lake City. Coale, H. K. 1911. *Colinus*. Kendeigh,

S. C. 1933. *Lagopus*. Kolderup, C. F. 1924. *Lanius*. Miller, A. H. 1931. *Ramphastos carinatus*. Shufeldt, R. W. 1913e. *Sialia s. sialia*. Taverner, P. A. 1922. *Tympanuchus c. cupido*. Gross, A. O. 1923b, 1926a.

About 5% attain an age of four years. *Riparia r. riparia*. Stoner, D. 1937b.

Autopsy studies. *Gallus*. Thompson, W. C. 1922a.

Death rates of three standard breeds of fowl. Harris, J. A. & Boughton, D. C. 1928. In first year. Dudley, F. J. 1928.

Deformed birds sacrificed by parents. *Fringilla coelebs*. Ballan de Ballensée, J. 1924.

Destruction of wild birds throughout world. Buckland, J. 1911.

Hatching period. Causes of death. *Gallus*. Dareste, C. 1885a.

In incubator. *Gallus*. Dunn, L. C. 1921.

Mortality under natural and artificial conditions. Butler, J. 1913.

Relation to fertility of eggs. *Gallus*. Jull, M. A. 1928b.

Suicide. Bacmeister, W. 1911.

Unknown cause. *Xanthocephalus xanthocephalus*. Roberts, T. S. 1909.

Wounded water birds. Forbush, E. H. 1923b.

Zoological Gardens of London. Plimmer, H. G. 1910, 1912, 1913.

BREEDING SEASON, MORTALITY

General. *Melospiza melodia beata*. Nice, M. M. 1932b.

Percentages of males and females. *Melospiza melodia beata*. Nice, M. M. 1933b.

CAUSES OF DEATH

General. *Gallus*. Dearstyne, R. S., Kaupp, B. F., & Wilfong, H. S. 1929; Kaupp, B. F. 1916.

Carabideous larvae. *Serinus*. Gunn, T. E. 1866-67.

Disease. See also under **Pathology**. *Strix flammea*. Williams, W. J. 1917.

Epidemic disease in severe cold weather. *Corvus*. Ridgway, R. 1893b.

Maggot infection. Arnold, W. W. 1919.

Overfeeding. *Sayornis*. Lincoln, F. G. 1926b.

Parasites. Woodruff, E. S. 1907. Ticks. Kelso, J. E. 1903; Urban, W. S. 1903a.

Severe pain suffered just before being put to sleep. Sleep induced by placing head under wing and swinging bird. *Gallus*. Féré, C. 1895f.

Spiders. *Trochilidae* & *Zosterops*. Shuckard, W. E. 1842.

Accidents

General. Taylor, H. R. 1893a.

Automobiles. White, F. B. 1927. Many species. Stoner, D. 1925b. *Otus a. asio*. Sutton, G. M. 1927c. *Picidae*. Baldwin, H. I. 1926; Dill, H. R. 1926.

Cutting vagus nerve. *Columba* & *Gallus*. Anrep, B. 1880.

Eating twine. *Turdus m. migratorius*. Bergtold, W. H. 1927.

Forest fires. *Bonasa u. umbellus*. Richter, C. H. 1925.

Fumigation operations. California. Howell, A. B. 1914.

Hollow tree. Ducks sometimes unable to get out of hollow tree which they have entered. Mershon, W. B. 1927.

Impaling on sharp twigs. Kumlein, A. J. 1876.

Niagara Falls. Swimming birds. Cole, L. J. 1909b; Phillips, J. C. 1929. *Cygnus*. Fleming, J. H. 1912. *Olor*. Evelyn, F. W. 1909.

Oil from ships. Collinge, W. E. 1912a; Wilcox, L. 1929. Book. Text in English. Wright, G. M. & Thompson, B. H. 1935.

Swallowing large number of indigestible objects, including nails, buttons, knife blade, brush, fork, grass, etc. *Struthio*. Humbert, F. 1798.

Too large a beetle swallowed. Kumlein, A. J. 1876.

Trains. Barbour, E. H. 1895.

Traps for birds. Destruction or injury. Rowan, W. 1925a.

STRIKING BUILDINGS OR WIRES
USUALLY IN MIGRATIONS AT NIGHT
General. Culver, D. E. 1916.

Electric lights. Chubb, H. B. 1884; Dannenhour, F. H. 1889.

Lighthouses. Allen, J. A. 1880a; Blasius, R. 1890; Hennicke, C. R. 1914; Lewis, H. F. 1927a.

Telegraph wires. Aldrich, C. 1877a; Armistead, J. J. 1881; Barbour, E. H. 1895; Coues, E. B. 1876a; Cretté de Palluel, A. 1889; Gunn, T. E. 1866a; Kettner, T. 1870; Liebe, K. T. 1882; Martin, L. 1870b.

Telephone wires. *Phalacrocorax*. Bloeker, J. C. 1927.

Towers

City hall tower. Slaughter, — & Baily, W. L. 1901-02.

Electrified towers. Noble, G. 1885.

Statue of Liberty and Washington Monument. Anon. 1887b.

Asphyxiation

General. Bert, P. 1872.

Experimental asphyxia. Includes birds. Veratti, J. 1773.

Bad weather

General. Woodruff, E. S. 1907. Sea birds. Patten, C. J. 1900. *Hirundinidae*. Briggs, J. J. 1855.

Excessive rains. Bowdish, B. S. 1904b.

Freezing over of Lake Cayuga. *Anatidae*. Cahn, A. R. 1912.

Severe winter weather. Bunyard, P. F. 1917a, b; Cretté de Palluel, A. 1899a; Jourdain, F. C. & Witherby, H. F. 1918; Moffat, C. B. 1917; Wallis, H. M. 1917; Whitney, E. R. 1893.

Sudden cold in summer. Fitzherbert-Brockholes, W. 1886.

STORMS

General. Eates, E. R. 1927; Lyell, J. C. 1872; Rice, J. H. 1924; Saunders, W. E. 1907, 1930; Wayne, A. T. 1894. Include birds. Gray, R. 1881, 1885. Sea birds. Nelson, T. H. 1914; Tuck, J. G. 1894. Young water birds. Reagan, A. B. 1910. *Calcarius l. lapponicus*. Roberts, T. S. 1907. *Compsothlypidae*. Sherman, A. R. 1916.

Turdus m. migratorius. Childs, J. L. 1913. *Vanellus*. Harvie-Brown, J. A. 1899a.

Lightning. Gurney, J. H. Jr. 1907; Jourdain, F. C. 1907a; Legee, O. 1900. Anserinae. Portal, M. 1913.

Snow storm. Austrian Alps. Many species. Tratz, E. P. 1921.

During migration flight

General. Hancock, J. L. 1888a.

Severe storm. Deane, R. 1914.

During migration over

Baltic Sea. Thienemann, J. 1925.

Large lake. Deane, R. 1880.

Hail stones

General. Felger, A. H. 1903a.

Measurements and weights of hail stones. Martin, P. 1907.

Poisoning by

Bitter almonds. Sudden death. *Serinus*. Dürr, G. T. 1694.

Daubentonia. Poultry. Shealy, A. L. & Thomas, E. F. 1928.

Food. Shore birds. Austin, O. L. Jr. & Sr. 1931.

Lead. Water birds. Wetmore, A. 1918c. Anatidae. McAtee, W. L. 1908b.

Quinine, minimum lethal dose of. Includes *Gallus*. Maurel, E. 1902.

Rattlesnakes. *Aphelocoma californica woodhousei*. Woodbury, A. M. 1933.

Rose chafer beetles. Neurotoxin present. *Gallus*. Lamson, G. H. 1915, 1922.

Strychnine. Falck, F. A. 1899.

EATING POISON INTENDED FOR PESTS IN AGRICULTURE

General. McAtee, W. L. 1917c.

Arsenic used in poisoning grasshoppers. Whitehead, F. E. 1934.

Strychnine. *Lophortyx c. californica*. Pierce, C. C. & Clegg, M. T. 1915, 1916.

Predatory animals

General. Woodruff, E. S. 1907.

Birds. *Pica* & *Carine*. Veverán, I. 1909.

Cats. Forbush, E. H. 1916.

Squirrels and Garrulinae. Böckmann, F. 1877; Gentry, T. G. 1873.

Starvation

General. Newman, E. 1867. *Asio brachyotus*. Service, R. 1894. *Carduelis*. Hartmann, P. J. 1694. *Otus a. asio*. Sutton, G. M. 1927c. *Petrochelidon*. Kimball, F. H. 1889.

Youngest nestlings getting little food because older and stronger nestlings get it. Dunlop, E. B. 1912.

EMBRYO MORTALITY

General. Dunlop, E. B. 1910; Hannas, R. R. 1917; Ingersoll, A. M. 1913. *Gallus*. Hutt, F. B. 1929d; Hutt, F. B. & Pilkey, A. M. 1930.

Factors

General. Many species. Lincoln, F. C. 1931. *Gallus*. Dunn, L. C. 1924e; Lewis, H. R. 1919; Sanctuary, W. C. 1925.

Asphyxia. Eggs retained abnormally in oviduct. Riddle, O. 1923e.

Effect of humidity. *Gallus*. Romanoff, A. L. 1929c.

Time of distribution. *Gallus*. Payne, L. F. 1919.

YOUNG BIRDS

General. Ingersoll, A. M. 1913; Tobias, L. 1852. *Cuculus*. Owen, J. H. 1913a. *Gallus*. Dearstyne, R. S., Kaupp, B. F., & Wilfong, H. S. 1929; Graham, C. K. 1906; Kaupp, B. F. 1916. *Larus argentatus*. Dutcher, W. & Bailly, W. L. 1903; Strong, R. M. 1914, 1923a; Ward, H. L. 1906a.

High mortality among young at breeding places. *Sterna*. Galloway, A. R. & Thomson, A. L. 1914.

MYOLOGY

Intrinsic muscles of various organs are included in the sections for such structures. For the functions of voluntary muscles, see under *Locomotion*.

Books. Text in Dutch. Man, J. G. 1873.

Text in English. Owen, R. 1866-68. *Apertyx*. *Owen, R. 1879. *Corvus corone*. Shufeldt, R. W. 1890b.

Text in French. Alix, H. E. 1874a; Cuvier, G. L. 1805. *Aquila*. *Milne-Edwards, A. 1867-71.

Text in German. Cuvier, G. L. 1805; Gadow, H. F. 1891d; Merrem, B. 1781. Includes birds. Siebold, K. T. & Stannius, F. H. 1846. Birds incidental. Gurlt, W. 1879. *Gallus*. Schneider, A. F. 1879; Tiedemann, F. 1810-14.

Text in Latin. *Alton, J. S. 1837; Coiter, V. 1575; Schneider, J. G. Vol. 2, page 45, 1788-89.

General. Alix, H. E. 1864a, 1867; Dablow, A. 1925; Deiters, O. 1856; Forbes, W. A. 1881g; *Fürbringer, M. 1888; *Gadow, H. 1882a, 1891a; Vicq d'Azyr, F. 1776-78. Many species. Barkow, H. C. 1829; *Ulrich, C. B. 1875. Includes birds. Humphrey, G. M. 1872. Blood-sucking birds. *Moller, W. 1931. Normal and wingless fowls. Kirkham, W. B. & Haggard, H. W. 1915.

Accipitres. Beddard, F. E. 1889d. *Aeronautes*. Marshall, M. E. 1907. *Alca*. *Carlsson, A. 1884. Alcedinidae. Mitchell, P. C. 1901b. *Alcedo hispidus*. Cunningham, R. O. 1870. *Anastomus*. Beddard, F. E. 1901e. *Aptenodytes patagonica*. *Reid, J. 1835. *Apteryx*. *Owen, R. 1842, 1849. *Aquila*. Steno, D. N. 1673a, b. Ardeidae. *Mitchell, P. C. 1913a. *Bubo*. Marshall, M. E. 1907. *Buceros*. Owen, R. 1833. *Carpophaga latrans*. Garrod, A. H. 1878a. *Cathartes*. Giebel, C. G. 1857a. *Ceryle stellata*. Cunningham, R. O. 1870. *Chauna derbiana*. *Garrod, A. H. 1876e. *Chunga burmeisteri*. Beddard, F. E. 1889c. *Colius*. Pycraft, W. P. 1907e. Columbidae. Mitchell, P. C. 1899. *Colymbus*. *Coues, E. B. 1867. *Coracias garrula*. Nitzsch, C. L. & Giebel, C. G. 1857b. *Corvus c. corax*. *Klemm, F. 1864. Cuculidae. Beddard, F. E. 1902b. *Cygnus*. Wiedemann, C. R. 1801. *Cypselus apus*. Nitzsch, C. L. & Giebel, C. G. 1857c. *Dacelo gigas*. Cunningham, R. O. 1870. *Eudypetes*. *Carlsson, A. 1884. Eurylaemidae. Forbes, W. A. 1880a. *Eurylaemus*. Garrod, A. H. 1878d. *Gallinago*. Beddard, F. E. 1901d. *Geococcyx*. Marshall, M. E. 1907; Shufeldt, R. W.

1886b. Gruiformes. Mitchell, P. C. 1901a. *Gypaetos barbatus*. Nitzsch, C. L. & Giebel, C. G. 1866c. *Heliornis surinamensis*. Beddard, F. E. 1893. *Indicator*. Garrod, A. H. 1878c. *Leptosoma*. Forbes, W. A. 1880c. Limicolae. *Mitchell, P. C. 1905. *Megacephalon maleo*. Garrod, A. H. 1878e. Megapodidae. Oustalet, E. 1880a. *Mergulus*. *Carlsson, A. 1884. *Mormon*. *Carlsson, A. 1884. *Nothura*. Alix, H. E. 1874b. *Opisthocomus cristatus*. Mitchell, P. C. 1896a; Perrin, J. B. 1877. Parridae [Jacanidae]. Forbes, W. A. 1881e. *Phoenicopterus*. Weldon, W. F. 1883. Picidae. Burt, W. H. 1930. *Plotus*. *Garrod, A. H. 1876c, 1878b. *Podoca surinamensis*. Giebel, C. G. 1861b. *Psarisomus*. Garrod, A. H. 1878d. *Pseudocalyptomena*. Lowe, P. R. 1931. Psittaci. Mudge, G. P. 1897; Nitzsch, C. L. 1859; Nitzsch, C. L. & Giebel, C. G. 1862c. Psittacidae. Giebel, C. G. 1862. *Psophia crepitans*. Traill, T. S. 1826. *Pterocles*. Gadow, H. F. 1882c. *Rhea*. Gadow, H. F. 1885; Haughton, S. 1867c. *Speotyto*. Shufeldt, R. W. 1889b. Spheniscidae. Filhol, H. 1883d; *Gervais, F. L. & Alix, E. 1877. Sphenisciformes. Lowe, P. R. 1933a. *Spheniscus demersus*. Smith, J. W. 1891. *Steatornis*. Garrod, A. H. 1873c. *Strepera*. Leach, J. A. 1914. *Strix*. Heusinger, K. F. 1822b. *Struthio*. Garrod, A. H. & Darwin, F. 1872; Haughton, S. 1867a, c; Sloane, H. 1724. *Thalassidroma*. Forbes, W. A. 1881h. *Trochilus colubris*. Crisp, E. 1862b. *Upupa epops*. Nitzsch, C. L. & Giebel, C. G. 1857d. *Vultur fulvus*. Nitzsch, C. L. & Giebel, C. G. 1863.

Development. *Apteryx*. Parker, T. J. 1892a. *Gallus*. Maj, A. 1901; Olivo, O. 1924c, 1925a, c; Paterson, A. M. 1887. Strigidae. *Müller, W. 1907. Includes birds. Schneider, A. F. 1876.

Dissection of entire bird showing muscles. *Columba*. Book. Text in German. *Vogt, C. C. & Yung, E. 1888-94.

Spinal muscles. Book. Text in English. Milne-Edwards, A. 1867-71.

Taxonomic considerations of muscle. Shufeldt, R. W. 1887b. Many species. Shufeldt, R. W. 1887j. *Attagis*. Garrod, A. H. 1877c. *Eurylaemus*. Garrod, A. H. 1878d. Passeres. *Garrod, A. H. 1876g. *Thinocorus*. Garrod, A. H. 1877c.

AXIAL MUSCLES

Cervical muscles

General. *Boas, J. E. 1929; Kulczycki, W. 1908. Bucerotidae. Desselberger, H. 1930a. *Plotus*. Doenitz, F. C. 1873; Forbes, W. A. 1882k; Virchow, H. J. 1917b. *Rhea*. Virchow, H. J. 1917a. *Rhytidoceros*. Desselberger, H. 1930a. Includes birds. Strong, R. M. 1915a.

Laryngeal muscles. *Casuarus*. Thébault, V. 1891. Many species. Yarrell, W. 1833b.

STERNO-TRACHEAL MUSCLES

These muscles extend variably along the trachea in different groups. When a portion of the trachea enters bone, these muscles leave the trachea but rejoin it when it emerges.

General. Maynard, C. J. 1889f. Many species. Yarrell, W. 1833b. *Campethera*. Steinbacher, J. 1935. *Casuarus*. Thébault, V. 1891; Wedemeyer, G. 1824. *Crax yarrellii*. Yarrell, W. 1831e. *Dendropicus*. Steinbacher, J. 1935. *Erimatura jamaicensis*. Wetmore, A. 1917c. *Ourax milu*. Yarrell, W. 1831d. *Thripias*. Steinbacher, J. 1935.

Head muscles

Book. Text in German. *Lakjer, T. 1926.

General. Bittner, H. 1925b. Includes birds. Kaczander, J. 1889.

Spheniscidae. Filhol, H. 1883c. *Tringa*. Pycraft, W. P. 1893a.

Development. Includes *Anas*. Futamura, R. 1907. *Gallus*. *Edgeworth, F. H. 1907; Kaczander, J. 1885. *Larus ridibundus*. *Matys, V. 1908. *Passer*. Futamura, R. 1907.

Morphology. Include *Gallus*. Edgeworth, F. H. 1907, 1911.

Muscles innervated by trigeminal nerve. Includes birds. Book. Text in German. *Lakjer, T. 1926.

Orbit muscles. *Larus ridibundus*. *Matys, V. 1908.

Posterior head muscles. Chappuis, —. 1877.

Subhyoid region. Birds incidental. Chaine, J. 1902.

BEAK MUSCLES

General. Hérissant, F. D. 1752. *Loria*. *Duerst, U. 1909; Yarrell, W. 1829.

Entotympanic muscle. Function in control of flexible part of beak. *Gallinago*. Workman, W. H. 1907b.

Jaw muscles. Include birds. Dubecq, J. 1925; Teutleben, F. E. 1874. Birds incidental. Gregory, W. K. & Adams, L. A. 1915. Includes *Gallus*. Kaczander, J. 1889.

Depressor of mandible

General. *Chrysotis*. Chaine, J. 1901b. *Colymbus*. Chaine, J. 1901a. Includes birds. *Chaine, J. 1905b.

Tendons. Psittacidae & *Sturnus*. Chaine, J. 1903b.

Hyoid muscles

General. Many species. Duvernoy, G. L. 1835a; Zavattari, E. 1911. *Casuarus*. Thébault, V. 1891. *Corvus*, *Fringilla*, & *Parus*. S., —. 1854. *Pelecanus*. Alix, H. E. 1877.

Infrahyoid muscles. *Anas*, *Buteo*, *Chrysotis*, *Columba*, *Corvus*, *Gallus*, & *Picus*. Rouvière, H. 1906.

EYE MUSCLES

Development. *Anas*. *Rex, H. 1901b. *Gallus*. Adelman, H. B. 1927. *Larus*. *Rex, H. 1914, 1924.

Extrinsic muscles. Burhard, O. 1902; Méry, J. 1733c. Includes *Gallus*. Corning, H. K. 1902. *Anser*, *Corvus*, *Gallus*, & *Meleagris*. Barkard, O. 1902. *Larus ridibundus*. *Matys, V. 1908. *Meleagris*. Schlemm, F. 1834.

Eye lids. *Struthio*. Stibbe, E. P. 1928.

TONGUE MUSCLES

These muscles are intimately related to the hyoid muscles. Chaine, J. 1904c, 1905a. *Acanthorhynchus*. Lucas, F. A. 1894c. *Alca*. Chaine, J. 1904b. *Casuarus*. Thébault, V. 1891. *Coereba coerulea* & *C. cyanea*. Lucas, F. A. 1894c. *Corvus*. S., —. 1854. *Dendroica*. Lucas, F. A. 1894c. Falconidae. Greschik, E. 1928. *Fringilla*. S., —. 1854. *Fulica*. Chaine, J. 1904b. *Glossoptila*. Lucas, F. A. 1894c. *Mergerus*. Chaine, J. 1904b. *Parus*. S., —. 1854. *Podiceps*. Chaine, J. 1904b. Psittaci. *Mudge, G. P. 1897, 1902.

Struthio. Chaine, J. 1904b. Trochilidae. Lucas, F. A. 1892b.

Branching of muscles in tongue. *Gallus* incidental. Rippmann, T. 1862.

Development. *Anas*. Kallius, E. 1905. *Melopsittacus*. Kallius, E. 1906. *Passer*. Kallius, E. 1905.

M. glosso-hyoideus. Many species. Chaine, J. 1905a.

M. mylohyoideus. Many species. Chaine, J. 1899a, b.

Trunk muscles

General. Many species. *Magnus, H. F. 1867. *Anas*. Lateral view pictures. *Magnus, H. F. 1867. *Columba*. Good illustrations. Magnus, H. F. 1869. Includes *Corvus*. Sioli, E. 1875. Includes *Gallus*. Maurer, F. 1894.

Diaphragm muscle. See under **Respiratory organs**: Oblique septum. Tigri, A. 1871.

M. trapezius. Birds incidental. Nishi, S. 1922.

Respiratory muscles. Headley, F. W. 1893b. Many species. *Zimmer, K. 1935a.

Ventral trunk muscles. Development. *Anas* & *Gallus*. Fischel, A. 1895.

CAUDAL AND ANAL MUSCLES

General. *Meleagris* & *Pavo*. Porta, A. 1908.

Caudal region muscles. Birds incidental. Kaestner, S. 1892. Many species. Marshall, W. A. 1872a. Gallinae. Crisp, E. 1860. Caudal muscles. *Colymbus* & *Cuculus*. Paris, P. 1913. *Gallus*. *Toit, P. J. 1913. *Pavo*. Heming, G. C. 1844. *Puffinus* & *Trypanocorax*. Paris, P. 1913.

Development. Kaestner, S. 1892.

Myology in rumplessness. *Gallus*. Landauer, W. & Dunn, L. C. 1925.

INTERCOSTAL MUSCLES

General. Magnus, H. F. 1868.

Attachments to uncinat processes. Behrens, W. 1880.

PELVIC MUSCLES

General. Birds incidental. Kaestner, S. 1892. *Anas*. *Liebe, W. 1914.

Dromaeus [*Dromiceius*] *novae-hollandiae*. Houghton, S. 1867b. *Eudyples*. *Grunert, P. 1906. *Gallus*. Marcucci, E. 1924. Ratitae. Fine illustrations. *Gadow, H. F. 1880. *Rhea*. Haughton, S. 1867c. *Struthio*. Romer, A. S. 1923. Includes *Struthio*. Gregory, W. K. & Camp, C. L. 1918.

SYRINX MUSCLES

General. Cuvier, G. L. 1802; Cynthis, H. 1848; Herre, R. 1859. Bucerotidae. Beddard, F. E. 1889b. *Casuarus*. Wedemeyer, G. 1824. Passeres. *Setterwall, C. G. 1901. Many species. Réthi, L. 1908, 1923.

Development and structure. Many species. *Wunderlich, L. 1886.

FLIGHT MUSCLES (SHOULDER AND WING MUSCLES)

Books. Text in French. Alix, H. E. 1874a.

Text in German. *Buteo* & *Struthio*. Pfeiffer, H. 1854.

Text in Latin. Fabricius ab Aquapendente, H. 1618a.

General. Alix, H. E. 1874e, 1875a; Buchet, G. 1885, 1888, 1892; Chabrier, J. 1829; Garrod, A. H. 1875e; Heusinger, K. F. 1820; Jovanowitsch, M. 1876; Menier, F. 1913. Many species. *Fürbringer, M. 1902; L'Herminier, F. J. 1827; *Rüdinger, N. 1868, Schoepss, C. G. 1829a, b; Stejneger; L. H. 1887a, 1888, 1889; Strasser, H. 1877; Sundevall, C. J. 1843, 1886; Sy, M. 1936; Young, J. 1872.

Accipiter. Rolleston, G. 1869. *Aeronautes*. Marshall, M. E. 1907. *Anas*. Selenka, E. 1870a. *Aquila*. Strasser, H. 1886. *Ardea*. Lauth, E. A. 1830. *Bradypterus*. Pycraft, W. P. 1910b. *Bubo*. Marshall, M. E. 1907. *Chrysotis aestiva*. Thuet, M. J. 1838. *Columba*. MacGillivray, W. 1837-52. Selenka, E. 1870a; Strasser, H. 1886. *Coracornithes*. *Buri, R. O. 1900. *Corvus*. Amans, P. C. 1913b. *Didunculus*. Selenka, E. 1870a. *Diomedea*. Hector, J. 1895. *Dromiceius*. Rolleston, G. 1869. *Eudyples*. Hillel, E. 1904. Gallinae. Rolleston, G. 1869. *Gallus*. Selenka, E. 1870a; Strasser, H. 1878, 1886. *Geococcyx*. Marshall, M. E. 1907. *Hemiprocne zonaris*. Lucas, F. A. 1899b. *Larus*. Nitzsch, C. L. & Giebel, C. G. 1857a. *Lorius ruber*. Thuet, M. J. 1838. *Meleagris*. Amans, P. C. 1913b.

Opisthocomus. Banzhaf, W. 1929; Perrin, J. B. 1877. *Pezoporus*. Hector, J. 1895. *Psittacus*. Kuhlmann, H. 1842; Selenka, E. 1870a. *Psittacus chinensis*. Thuet, M. J. 1838. *Strin-gops*. Hector, J. 1895. *Struthio*. Rolleston, G. 1869. Tubinares [Procel-lariiformes]. *Forbes, W. A. 1882n; Reinhardt, J. T. 1873b.

Development. Schestakowa, G. S. 1927.

Fine illustrations. Many species. Jäger, G. 1857.

Nomenclature. Coues, E. B. 1888b.

Relation in form to wing area. Marey, E. J. 1869a.

Depressors

Eight to fifteen times heavier than elevators. Houssay, F. & Magnan, A. 1911.

M. deltoideus. Micropodidae. Lucas, F. A. 1896b.

Mm. dermo-tensor patagii

General. Shufeldt, R. W. 1887c.

Taxonomic consideration. Shufeldt, R. W. 1887b.

Pectoral muscles

General. Fabricius ab Aquapendente, H. 1618a.

WEIGHT RELATIONS TO

Manner of flight. Many species. Magnan, A. 1913g.

Power of flight. Edwards, C. L. 1886.

Wing area. Houssay, F. & Magnan, A. 1911.

Shoulder muscles

General. Fürbringer, M. 1885b, 1886; Retzius, A. A. 1842a.

Tendons of wing muscles

General. Many species. Robin, C. P. & Chabry, L. M. 1884. Procel-lariidae. Reinhardt, J. T. 1873b.

Structure, gross and microscopic, of tendon of anterior patagium. Anser. Romankewitsch, N. A. 1930.

LIMB MUSCLES

General. Many species. Schröder van der Kolk, J. L. & Vrolik, W. 1848; Sundevall, C. J. 1856. Include birds.

Macalister, A. 1868, 1869, 1875-77. Columbidae. Haswell, W. A. 1879, 1883a, b, c. *Phaethon*. Beddard, F. E. 1897b. *Phalaenoptilus*. Marshall, M. E. 1906. *Rhynchotus rufescens*. Alix, H. E. 1876. *Scopus*. Beddard, F. E. 1884. Tubinares [Procellariiformes]. *Forbes, W. A. 1882n. *Zeledonia*. Pycraft, W. P. 1905d.

Development. *Anas* & *Gallus*. Fischel, A. 1895.

Flexor muscles

Homologies. Includes birds. Macalister, A. 1868.

Perforated flexor muscles. Mitchell, P. C. 1894a.

Tendons. *Macropteryx*. Lucas, F. A. 1895b.

Leg muscles, including thigh and foot

Book. Text in French. Alix, H. E. 1875a.

General. Alix, H. E. 1866; Beddard, F. E. 1914. Many species. *Quennerstedt, A. 1872. Birds incidental. Chaine, J. 1910; Focacci, M. 1902. *Aquila*. Alix, H. E. 1864b. *Bradypterus*. Pycraft, W. P. 1910b. *Buteo*. Neander, E. 1875. Cuculidae. Beddard, F. E. 1885d, 1902b. *Dromaeus* [*Dromiceius*] *novae-hollandiae*. Haughton, S. 1867b. *Eudytes*. *Grunert, P. 1906. *Hemiprocne zonaris*. Lucas, F. A. 1899b. *Megapodius*. Flynn, T. T. 1910. *Meleagris*. *Petit, M. 1925. *Opisthocomus cristatus*. Mitchell, P. C. 1896a; Perrin, J. B. 1877. *Parus atricapillus*. Palmgren, P. 1932. *Pelecanoides*. Garrod, A. H. 1881. *Pelecanus*. Alix, H. E. 1877. *Ratitae*. Handsome plates. *Gadow, H. 1880. *Regulus r. regulus*. Palmgren, P. 1932. *Rhea*. Alix, H. E. 1874h; Haughton, S. 1867c.

Attachments well illustrated. *Dromaeus* [*Dromiceius*] *novae-hollandiae*. Haughton, S. 1867b, c.

THIGH MUSCLES

General. *Garrod, A. H. 1873a, 1874b. Many species. Garrod, A. H. 1873b. *Gallus*. Marcucci, E. 1924. *Passer domesticus*. Menier, F. 1912.

Development. *Gallus*. *Romer, A. S. 1927.

M. amblens

General. Columbae. Garrod, A. H. 1874d.

Absence or presence. Ciconiidae. Garrod, A. H. 1877b. Psittacidae. Garrod, A. H. 1874e.

Taxonomic consideration. Columbidae. Garrod, A. H. 1875a.

Variation. *Opisthocomus cristatus*. Mitchell, P. C. 1896a.

LEG MUSCLES AND TENDONS

Deep flexor tendons. *Macropteryx*. Lucas, F. A. 1895b.

Perforated flexor tendons. Mitchell, P. C. 1894b.

Peroneal muscles. Mitchell, P. C. 1913b.

FOOT MUSCLES AND TENDONS

General. Alix, H. E. 1874e; Lucas, F. A. 1894a; Mitchell, P. C. 1894b. *Gallus*. Kaufmann-Wolf, M. 1908. *Nycticorax*. Resler, A. 1896.

Hyperdactyl foot. *Gallus*. Grönberg, G. 1894; Kaufmann-Wolf, M. 1908.

Tendons. Histology. *Buteo*, *Columba*, *Corvus*, *Numenius*, *Passer*, *Scolopax*, *Sula*, & *Tetrao*. Schaffer, J. 1903.

Toe muscles. Kopperi, A. J. 1928.

PLANTAR TENDONS

General. *Macropterygidae*. *Garrod, A. H. 1875b.

Deep plantar tendons. *Galbulidae*. Miller, W. D. 1919a. *Trochilidae*. Gadow, H. F. 1895; Lucas, F. A. 1895d.

MORPHOLOGY OF MUSCLE**Cardiac (heart) muscle**

Histogenesis. Marceau, F. 1903; Shipley, P. G. 1916. *Gallus*. Assaky, G. 1883; Clarke, J. L. 1862; *Schlater, G. G. 1907; *Wieman, H. L. 1907.

Histology. Many species. Marceau, F. 1902, 1903. Include *Columba*. Gastaldi, D. B. 1861; Lebert, H. 1849a. *Trochilus*. *Jordan, H. E. 1911.

CYTOLOGY

Cytoreticulum. *Gallus*. Wieman, H. L. 1907.

Intercalated discs. *Trochilus*. Jordan, H. E. 1911. Includes *Trochilus*. Jordan, H. E. & Steele, K. B. 1912.

Myofibrillae. Embryo. *Gallus*. Levi, G. 1922b, 1923; Wieman, H. L. 1907.

Experimental

General. *Anas*, *Columba*, *Gallus*, & *Meleagris*. Kato, Y. 1928.

Tissue culture. Embryo heart. *Gallus*. Levi, G. 1922b, 1923.

Skeletal muscle

General. Keibel, F. 1914. *Chloris*, *Gallus*, & *Passer*. Schiefferdecker, P. 1913.

Degeneration following lesions of vestibular apparatus. *Columba*. Soprana, F. 1907.

Form, endings, and relations. Includes *Passer*. Gage, S. P. 1888.

Measurements of fibers of skeletal muscle. Includes *Carduelis*. Mayeda, R. 1890.

Specific gravity. *Columba* & *Gallus*. Carvallo, J. L. & Weiss, G. 1899.

White and red muscle compared. Heinroth, O. 1927. *Gallus* incidental. Meyer, E. 1875.

CYTOLOGY

General. Fusari, R. 1894. Include birds. Holmgren, A. E. 1907; Knoblauch, A. 1908, 1912; Lebert, H. 1849b; Schneider, A. F. 1876. *Columba*. Thulin, I. 1915. *Gallus* incidental. Rippmann, T. 1862.

Cytological difference. Includes *Columba*. Ewald, W. 1912. *Gallus*. Green, G. D. 1896.

Distinction between fibers rich and poor in sarcoplasm. *Columba*. Prenant, A. 1912.

HISTOGENESIS

General. Tello, J. F. 1922a. *Anas*. Kaestner, S. 1890. *Gallus*. *Duesberg, J. 1909, 1910; Engert, H. 1900; Kaestner, S. 1890; Meves, F. 1909; Młodowska, J. 1909; Schlater, G. G. 1905, 1906. Include *Gallus*. Braidwood, P. M. 1866; Clarke, J. L. 1862; *Lebert, H. 1849a; Rouget, C. 1862b.

Myofibrillae. *Gallus*. Collado, A. C. 1925.

Smooth muscle

See also under various organs that contain smooth muscle.

General. Helm, A. F. 1884, 1886. *Otis*. Murie, J. 1869.

Air sacs. Includes *Gallus*. Piso-Borne, G. 1870.

Amnion. *Gallus*. Verzár, F. 1908.

Blood vessels, development. Müller, E. 1888.

Dilator pupillae. *Anas* & *Columba*. *Zietzschmann, O. 1909.

Reproductive organs. *Columba* & *Gallus*. Aeby, C. T. 1859.

Sphincter of iris. Structure of fibers. Grynfeltt, E. 1905b.

INTEGUMENTAL SMOOTH MUSCLE

General. Many species. *Helm, A. F. 1884, 1886. Includes many species. Seuffert, L. 1862. *Lophorina superba*. Viallane, H. 1878b.

Uropygeal gland. Many species. Kossmann, R. 1871.

Feather muscle

General. *Langley, J. N. 1904. Many species. *Helm, A. F. 1884, 1886. *Apteryx*. Owen, R. 1842. *Columba*. Langley, J. N. 1902. *Paradisaea*. Pycraft, W. P. 1905b. *Sphenisciformes*. Lowe, P. R. 1933a.

Innervation

General. *Meleagris*. Jegorow, J. 1890.

Center in cerebral cortex. *Gallus*. Weber, E. 1906.

STOMACH AND INTESTINE

General. *Columba* & *Gallus*. Lelièvre, A. & Retterer, E. 1909.

Gizzard. *Chloris*, *Gallus*, & *Passer*. Soli, U. 1906.

PHYSIOLOGY

General. *Columba*. Schwarzkopf, E. 1908.

Changes in inanition. *Columba* & *Corvus*. Eichhorst, H. L. 1879.

Degeneration. Embryo. *Gallus*. Hunt, E. A. 1932.

Hemoglobin in muscle tissue. *Gallus*. Kennedy, R. P. & Whipple, G. H. 1928.

Lactic acid, formation in muscles. *Columba* & *Gallus*. Schmitt-Krahmer, C. 1927.

Metabolism of tonic and atonic muscle. Mündelein, J. 1932.

Relation between amount of catalase and work done. Includes *Columba*. Burge, W. E. 1916.

Respiratory muscle. Contractions inhibited by stimulation of central end of vagus nerve. *Gallus*. Meyer, A. L. 1916-17.

Atrophy

After ablation of semicircular canals. *Columba*. Soprana, F. 1905, 1906.

Due to experimental lesion of semicircular canals. *Columba*. Soprana, F. 1907.

Functions

In flight. *M. pectoralis*. Brearey, F. W. 1882.

Leg muscles. *Rhea*. Haughton, S. 1867c. *M. ambiens*. *Columba*, *Corvus*, *Ibididae*, *Pavo*, *Psittacus*, & *Strigidae*. Brauer, A. 1911.

Respiratory muscles. Many species. *Zimmer, K. 1935a.

Xiphoid bone, muscles attached to. *Pelecanus* [*Phalacrocorax*] *carbo*. Yarell, W. 1828a.

Mechanics of muscle action

General. Haughton, S. 1867b, c.

Action in perching. Watson, M. 1869.

Leg. *Anser*, *Anthropoides*, & *Falco*. Haughton, S. 1867d. *Branta*, *Dromiceus*, *Falco*, *Megalornis*, *Rhea*, & *Struthio*. Haughton, S. 1867b, c.

Measurements of power. *Gallus*. Chaîne, J. 1920b.

Neck. Action of bones and muscles. *Rhytidoceros*. Desselberger, H. 1930a.

Pelvis. *Rhea*. Haughton, S. 1867c. *Struthio*. Haughton, S. 1867a, b.

Respiratory muscles. Includes birds. Siefert, E. 1896.

CONTRACTIONS

First contractions. Embryo. *Gallus*. Olivo, O. 1924c, 1925c.

Stimulus rhythm, effects. Includes *Columba*. Gildemeister, M. 1910b.

Temperature effects. Includes *Columba* & *Gallus*. Hess, W. R. & Ryffel, W. 1923.

MYTHOLOGY

See also under **Hibernation** and **History of Ornithology**.

Books. Text in English. British birds. Ingersoll, E. 1923; Swann, H. K. 1913.

General. *Pavo*. Santini de Riols, E. N. 1907.

Cock with human profile. *Gallus*. George, M. 1890.

Egg-carrying. *Columba f. fasciata*. Swarth, H. S. 1912b.

Native folk lore and superstitions. Madagascar. Sibree, J. 1891.

Serpent in egg. Paullin, C. F. 1706.

Superstitions connected with appearance of various birds as prognosticators. Johnson, H. H. 1899.

White feathers due to pain. *Gallus*. Anon. 1890b.

MEDICINE

Medicinal virtues. Includes birds. Names of species in English, Irish, and Latin. Book. Text in English. Keogh, J. 1739. Text in Latin. Keogh, J. 1739.

Parts of birds in materia medica. Schenkling-Prévôt, C. 1895b.

Swallow's herb. Harting, J. E. 1867.

Swallow-stones having medicinal use. Calcareous opercula of *Turba* found in nests of swallows. Harting, J. E. 1867; Lebour, G. A. 1866.

NATURAL HISTORY

This section includes miscellaneous publications that deal with the activities of birds and were not easily classified under **Behavior**, **Ecology**, and **Habits**. These subjects should be consulted, however, for natural history items.

Books. Bible. Scheuchzer, J. J. 1731-35.

Text in Danish. Schiøtler, E. T. 1925-31.

Text in Dutch. Leeuwenhoek, A. 1686; Nylandt, P. & Hextor, J. 1672; Thijssse, J. P. 1906.

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43; Chisholm, A. H. 1935; Darwin, C. R. 1878; Davis, J. R. 1903; Edwards, G. 1743-51; Evans, A. H. 1909; Fitz-Simons, F. W. 1923; Harvie-Brown, J. A. & Buckley, T. E. 1895; Headley, F. W. 1895b; Herrick, F. H. 1902; Jardine, W. 1833-43; Knowlton, F. H. 1909; Langille, J. H. 1884; Lewin, J. W. 1838; Morris, F. O. 1875; Nicholson, E. M. 1927; Plinius, C. 1585; Seebohm, H. 1882d; Stanley, E. 1848; Wilson, A. & Bonaparte, C. L. 1831. Diving birds. Dewar, J. M. 1924. Nestling birds. Wheelock, I. G. 1902. Predatory birds. Blanchan, N. 1898. Waterfowl. Pirnie, M. D. 1935. Anatidae. Millais, J. G. 1902b; Phillips, J. C. 1922-26. *Colinus*. *Stoddard, H. L. 1925b, 1926b, 1931. Columbidae. Selby, P. J. 1843. *Cygnus columbianus*. Cooke, T. 1823. Gruidae. Blaauw, F. E. 1897. *Haliaeetus*. Gilbert, H. A. & Brook, A. 1925. *Pandion*. Abbott, C. G. 1911. *Phalacrocorax auritus*. Lewis, H. F. 1929. Phasianidae. *Beebe, C. W. 1926. *Plautus impennis*. Townsend, C. W. 1911a. *Struthio*. Martin, A. 1891.

Text in French. Bory de Saint-Vincent, J. B. 1822-31; Boubier, M. 1922; Buffon, G. L. 1770-86; Chenu, J. C. & Verreaux, J. 1862; Cuvier, G. L. 1817; Daudin, F. M. 1800; Drapiez, P. A. 1842; Lacépède, B. G. 1798; Le Maout, J. E. 1853; Lesson, R. P. 1830-31; Levaillant, F. 1801-02; Quinet, A. 1897. Includes birds. Dictionary. Orbigny, A. C. 1849-61. *Casuarium*. Perrault, C. 1671. Columbidae. Temminck, C. J. 1813-15. *Didus*. Gervais, F. L. 1867-69. Gallinae. Temminck, C. J. 1813-15. *Meleagris*. Perrault, C. 1671. Paradiseidae. Lesson, R. P. 1834-35. *Phoenixurus*. Boubier, M. 1925b. Psittaci. Levaillant, F. 1801-05. Psittacidae. Bourjot Saint-Hilaire, A. 1837-38. *Struthio*. Perrault, C. 1671. Trochilidae. Lesson, R. P. 1828, 1829-30; Mulsant, M. E. & Verreaux, E. 1873-79; Simon, E. L. 1921.

Text in German. Altum, B. 1868; Aristotle 1868; [Brehm, A. E. Tierleben]; Brehm, C. L. 1820-22; Gesner, C. 1555, 1600; Hilzheimer, M. & Haempel, O. 1913; Keller, C. 1905; Klein, J. T. 1760; Meerwarth, H. 1908; Merrem, B. 1788; Naumann, J. A. 1820-47; Naumann, J. F. 1905; Tiedemann, F. 1810-14. Arctic birds. Faber, F. 1825-26. European birds. Gloger, C.

W. 1834. Swimming birds. Floericke, C. E. 1898. Columbiformes. Reichenbach, H. G. 1845-62, 1861-62.

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General. Barrington, D. 1772; Blake, E. R. 1936a; Brandt, J. F. 1840a; Sokolowski, J. 1934; Ziembicki, W. 1927.

Illustrations from beautiful photographs. McClintock, N. 1917.

AREAS

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Dutch East Africa. Schuster, L. 1926a.

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America

NORTH AMERICA

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General. Falconiformes. Bent, A. C. 1937.

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MIDDLE AMERICA

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SOUTH AMERICA

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Island of Mellum. Near Greenland. Culemann, H. W. 1928.

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AUSTRALIA

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NEW ZEALAND

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DIFFERENT BIRDS

Acrocephalus palustris. Zimmermann, R. 1927. Anatidae. *Heinroth,

- O. 1912a. *Anser*. Madarász, G. 1909. *Astur palumbarius*. Weckwerth, W. 1925. *Campephilus principalis*. Hasbrouck, E. M. 1891. *Ciconia c. ciconia*. Schenk, J. 1908a. *Ciconia nigra*. Montagu, G. 1818. *Compsothlypis americana pusilla*. Mousley, W. H. 1926. *Cuculus*. Capek, V. 1926; Gurney, J. H. Jr. 1899; Jenner, E. 1788; Raspail, X. 1921; Walter, A. 1876; Wenzel, K. 1908. *Dendroica a. aestiva*. Mousley, W. H. 1926. *Dichoceros bicornis*. Bingham, C. T. 1897. *Ectopistes migratorius*. Alexander, A. M. 1927. *Egretta alba*. Wurga, K. 1931-34. *Falco eleonorae*. Krüper, T. J. 1864. *Fringilla*. Iverus, J. D. 1902. *Fringillidae*. Arinkina, T. & Kolesuikov, I. 1927; Kashkarov, D., Foss, L. P., Rusinova, K. I., Sataeva, Z. L., & Zaruba, E. A. 1926. *Gallinago gallinago*. Stubbs, F. J. 1911a. *Gallinula porzana*. Floericke, C. E. 1890a. *Gruidae*. Blyth, E. 1881. *Gypaëtus barbatus*. Kammer, A. 1922-24. *Hirundo*. Iverus, J. D. 1902. *Ixobrychus*. Hocke, H. 1903. *Lampronessa sponsa*. Heinroth, O. 1910a. *Lanius*. *Miller, A. H. 1931. *Larus*. Blake-Knox, H. 1866c, 1867b, 1868. *Larus r. ridibundus*. Stadie, R. 1929. *Megapodidae*. Oustalet, J. F. 1880a. *Meleagris*. Wright, A. H. 1914. *Melospittacus*. Russ, K. F. 1905. *Melospiza*. *Nice, M. M. 1934c. *Mergus*. Christoleit, E. 1927a. *Nesotor notabilis*. Marriner, G. R. 1907. *Oenanthe leucopyga eagra*. Arnault, C. 1926. *Oreophasis derbianus*. Blake, E. R. 1936b. *Pagophila eburnea*. Haag, F. 1908. *Parus ater*. Skovgaard, P. 1928g. *Passer domesticus*. Mather, F. 1880. *Passer montanus*. Biedermann-Imhoof, R. 1913a. *Passerella iliaca*. Linsdale, J. M. 1928c. *Pelecanus*. Burton, E. 1822; Stetter, F. W. 1865. *Phalacrocoracidae*. Morgan, A. M. 1916a. *Phalacrocorax*. Blake-Knox, H. 1866a. *Pharomacrus mocinno*. Blake, E. R. 1936b. *Phasianidae*. Ghigi, A. 1903b. *Pica*. Linsdale, J. M. 1937. *Picus major*. Harvie-Brown, J. A. 1892a. *Pisobia bairdi*. Dixon, J. S. 1917. *Podiceps*. Lönnberg, A. J. 1919d. *Pyrrhula*. Iverus, J. D. 1902. *Rissa*. Blake-Knox, H. 1866d, 1867a, 1870a. *Scolopax*. Büttow, A. 1909. *Seturus aurocapillus*. Mousley, W. H. 1926. *Serinus*. Bolle, C. 1858. *Spheniscidae*. Bikkessy, G. 1891. *Statornis caripennis*. L'Hermier, F. J. 1834. *Sterna paradisea* & *Sterna sandvicensis*. Direksen, R. 1932. *Stringops habroptilus*. Potts, T. H. 1873. *Strix flammea*. Bernhard, — & Schneider, W. 1928. *Sula [Moris] bassana*. Cunningham, R. O. 1866. *Tetrao*. Wurm, W. 1899a. *Trypanocorax*. Harper, E. 1905. *Urinator arcticus*. Zedlitz, O. 1913.
- Captive predatory birds. Müller, C. 1895a.
- Deaf when vocal. Anatomical explanation. *Tetrao urogallus*. Graff, L. 1885.
- Effects of violent storms. Faye, H. 1896.
- Existence of sea birds relatively safe. Grinnell, J. 1920a.
- Length of day, effects. Braun, F. 1918b.
- Parent carrying young. *Perdix*. Headley, F. W. 1907a.
- Résumé of "De arte venandi cum avibus" by Friedrich II 1596. Haskins, C. H. 1921.
- Significance of migrations in weather forecasting. Bjerkander, C. 1776.

NERVOUS SYSTEM

See also under Brain, Ear, Eye, Hearing, Meninges, Olfactory organs, Reflexes, Smell, Taste, and Vision.

Books. Text in German. Many species. Gadow, H. F. 1891d; Key, A. & Retzius, G. 1876; Stresemann, E. 1927-34.

General. Includes birds. Renzi, P. 1863. *Aeronautes* & *Bubo*. Marshall, M. E. 1907. Includes *Columba*. Beltonci, G. 1880. *Gallus* incidental. Schultze, O. 1904. *Geococcyx*. Marshall, M. E. 1907.

Anatomy

Books. See also under Zoology.

Text in English. Owen, R. 1866-68.

Text in French. Desmoulins, L. A. 1825; Gall, F. J. 1810-19; Hannover, A. 1844; Leuret, F. & Gratiolet, P. 1839-57; Longet, F. A. 1842, 1847. Includes birds. Ramón y Cajal, S. 1911. Includes *Anas* & *Gallus*. Ramón y Cajal, S. 1895.

Text in German. Many species. Gadow, H. F. 1891d. Include birds. *Edinger, L. 1904-08; Kappers, C. U. 1920-21; Treviranus, G. R. 1920.

Text in Latin. Remak, R. 1838.

Text in Spanish. Includes birds. Ramón y Cajal, S. 1899-04.

General. Includes birds. Bailly, E. M. 1824.

Lateral line system. Transitory in embryo. *Gallus*. Nussbaum, M. 1901c. *Larus*. Meek, A. 1907.

Development

Books. Text in English. *Gallus*. Lillie, F. R. 1919.

Text in French. Includes birds. Held, H. 1909a.

Text in German. Many species. Gadow, H. F. 1891d.

General. Birds incidental. Desmoulins, L. A. 1823a. *Gallus*. *Marshall, A. M. 1877, 1878a, b; Pticy, A. V. 1896. Include *Gallus*. His, W. 1879; Johnston, J. B. 1909a. *Passer*. Rau, A. S. & Johnson, P. H. 1923.

Action of lecithin. *Gallus*. Marza, V. 1929.

Brain and cranial nerves. Includes *Gallus*. Gräper, L. 1913.

Chorio-allantoic grafts. *Gallus*. *Hoadley, L. 1925.

Histolysis in development of neural tube. *Gallus*. Collin, R. 1906b.

Neural crests

General. *Gallus*. Goronovitsch, N. 1893a, 1894; Heagey, F. W. 1916-17.

Role of neural crests. Goronovitsch, N. 1892.

HISTOGENESIS

General. Falzacappa, E. 1888. Includes birds. Kato, N. 1922. Includes *Gallus*. Ramón y Cajal, S. 1906b.

Neuroblasts. *Anas*. *Ramón y Cajal, S. 1908d. *Gallus*. Bianchi, V. 1907; Ramón y Cajal, S. 1908d. Includes *Gallus*. His, W. 1890.

Ear innervation

General. *Anser* & *Gallus*. Hasse, C. 1873c.

External auditory meatus and tympanum. Kaji, H. 1926.

Paratympenic organ of Vitali. *Gallus*. Benjamins, C. E. 1925.

Tegmentum vasculosum. Kolmer, W. A. 1928.

Histology

Books. Text in French. Ramón y Cajal, S. 1895, 1911. Text in German. Lenhossék, M. 1894.

NEUROGLIA TISSUE

General. Birds incidental. Baker, F. 1893. *Columba* & *Gallus*. Duval, M. M. 1876, 1877. Includes *Gallus*. Held, H. 1904. *Passer*. Duval, M. M. 1876, 1877.

Development. *Gallus*. Arai, S. 1923.

Finer structure. *Gallus*. Da Fano, C. 1906.

Histogenesis

General. Achúcarro, N. 1916. *Gallus*. Lachi, P. 1891.

Developmental relations with vascular system. *Anas* & *Fringilla*. Achúcarro, N. 1915.

NEURONS OR NERVE CELLS

Collateral spines of dendrites. *Gallus*. Curreri, G. 1908.

Ganglion cells. Structure and function. Includes *Columba*. Jacobsohn, L. 1910.

General visceral afferent neurons. Includes *Passer*. Rossi, O. 1922.

Cytology

General. Includes birds. Biondi, G. 1911. *Columba*. Cowdry, E. V. 1911; Schüpbach, P. 1905. *Gallus*. Bombicci, G. 1899.

Axis cylinder. Includes *Columba*. Dogiel, A. S. 1893.

Effect of activity on nerve cells. Includes birds. Kocher, R. A. 1916.

Pigment. Psittaciformes. Mühlmann, M. 1913.

Trophospongia. *Columba*. Holmgren, A. E. 1915.

Chromophil substance (Nissl bodies)

Origin and genesis. *Gallus*. Arai, S. 1923.

Prolonged stimulation, effects. *Phalacrocorax penicillatus*. Carlson, A. J. 1903.

Neurofibrillae in

General. Auerbach, L. 1911-12.

Axon and end organ. Heringa, G. C. 1918.

Spinal cord. *Gallus*. Bianchi, L. 1906.

Spinal ganglia, cytology of

General. *Columba*. *Cowdry, E. V. 1912, 1913, 1914a, b. Includes *Gallus*. Bergen, F. 1904.

Development of neurons

Book. Text in Spanish. *Tello, J. F. 1922b.

General. Capobianco, F. 1900. *Gallus*. *Cameron, J. 1907; Collin, R. 1906c, 1908; *Fragnito, O. 1902a, b; Lenhossék, M. 1891; Pighini, G. 1904; *Ramón y Cajal, S. 1906a; *Tello, J. F. 1923. Includes *Gallus*. Shorey, M. L. 1909.

Fibers in central nervous system. *Gallus*. Civalleri, A. 1911.

Myelination. *Gallus*. Civalleri, A. 1911; *Schroeder, K. 1911. *Gallus* incidental. Sannomiya, N. 1927.

Neurofibrillae. *Gallus*. Fragnito, O. 1908; Gerini, C. 1908; La Pegna, E. 1905.

Neurons of spinal cord. Ramón y Cajal, S. 1890d.

Nucleoproteid-like granules in embryonic cells. *Gallus*. Arai, S. 1923.

Physiology of the nervous system

Books. Text in French. Include birds. Flourens, M. J. 1842; Gall, F. J. 1810-19.

General. Includes birds. Bailly, E. M. 1824. Birds incidental. Desmoulins, L. A. 1823a. *Columba*. Mangold, E. 1913. Includes *Columba*. Gudden, B. 1870. *Gallus*. Mangold, E. 1913; Szymanski, J. S. 1912.

Experimental studies. *Columba*. Trendelenburg, W. E. 1906b.

Glycogen occurrence. Includes birds. Gage, S. H. 1917.

Liberation of chemical substances in discharge of nervous impulse. *Gallus*. Nolf, P. 1922.

Proprioceptive mechanism in postural apnea. *Anas*. Paton, D. N. 1913.

Role of acetylcholin in discharge of nervous impulse. Nolf, P. 1922.

CENTRAL NERVOUS SYSTEM

General. Includes birds. Dumortier, B. C. 1843.

Spinal cord

General. Sömmering, S. T. 1792. Includes birds. Guillot, N. 1843. *Gallus*. *Nicolai, T. W. 1812; Shimada, K. 1922. *Passer montanus*. Shimada, K. 1922.

Degeneration preparations. Sections figured. *Columba*. Friedländer, A. 1898.

Embryonic rests. *Anser*. Mathis, J. 1929.

Relation in quantity of white and gray matter. Includes *Anser*, *Columba*, & *Struthio*. Hovy, A. J. 1913.

Segments. *Dromaeus* [*Dromiceius*]. *Hardesty, I. 1905.

Anatomy

Books. Text in German. Includes *Columba*, *Gallus*, & *Meleagris*. Stilling, B. 1856. *Gallus*. Loewe, L. 1880b.

General. Includes birds. Keuffel, —. 1810. *Anas* & *Anser*. Stieda, C. H. 1869a. *Corvus*. Metzler, A. 1855. *Gallus*. Metzler, A. 1855; Stieda, C. H. 1869a. Includes *Gallus*. Johnston, J. B. 1909a. *Passer*. Stieda, C. H. 1869a. *Struthio*. *Streeter, G. L. 1904.

Blood vessels. *Anas*, *Athene*, *Columba*, *Gallus*, *Numida*, & *Psittacus*. *Sterzi, G. 1903, 1904a. Includes *Anser*, *Corvus*, *Gallus*, & *Turdus*. Hofman, M. 1900.

Enlargements. *Dromaeus* [*Dromiceius*]. *Hardesty, I. 1905.

Excellent figure showing a dissection of brain and cord with nerve roots. *Gallus*. *Nicolai, T. W. 1812.

Filum terminale. *Anas*, *Columba*, & *Gallus*. Saint-Remy, G. C. 1888. *Columba*. Peck, J. I. 1889b. *Columba*, *Gallus*, & *Meleagris*. Book. Text in German. Stilling, B. 1856.

Lumbar region. *Columba*. Brown-Séquard, C. E. 1863.

Development

Book. Text in German. *Gallus*. Loewe, L. 1880b.

General. *Imhof, G. 1905. Birds incidental. Clarke, J. L. 1863. *Anser*. Mathis, J. 1929. *Gallus*. *Besta, C. 1904a, b; Holmdahl, D. E. 1925a; La Pegna, E. 1904; Loewe, L. 1880a; Retzius, G. 1893b; Sperino, G. 1892. Includes *Gallus*. Clarke, J. L. 1863. *Sturnus*. Holmdahl, D. E. 1925a.

Central canal. Includes birds. Romiti, G. 1873b. *Anas*, *Columba*, & *Gallus*. Saint-Remy, G. C. 1888.

Histogenesis. *Anas*. Marcora, F. 1911. *Gallus*. *Fraguito, O. 1902a, b, 1907; Lachi, P. 1889a, b, 1891; Marcora, F. 1911; Ramón y Cajal, S. 1890d.

Mechanical explanation. Includes *Gallus*. His, W. 1894.

Nucleoli of neuroblasts. *Gallus*. Collin, R. 1906a.

Histology

Book. Text in German. *Gallus*. Lenhossék, M. 1894.

General. *Anas* & *Columba*. Nemiloff, A. 1911; *Romano-Prestia, F. 1906. *Ectopistes*. *Romano-Prestia, F. 1906. *Gallus*. Martin, I. 1895. *Phalacrocorax*. Nemiloff, A. 1911. *Struthio*. *Streeter, G. L. 1904.

Caudal portion. *Anas*, *Columba*, & *Gallus*. Saint-Remy, G. C. 1888.

Physiology

General. *Anas*. *Clementi, A. 1913. *Columba*. Brown-Séguard, C. E. 1876; *Clementi, A. 1913. *Gallus*. *Clementi, A. 1913.

Ganglion cells. *Columba*. *Schüpbach, P. 1905.

Degeneration experiments

General. *Columba* & *Gallus*. Foster, L. 1911.

Cutting posterior roots and extirpation of labyrinth. *Columba*. Trendelenburg, W. E. 1906b.

Extirpation of upper part of spinal cord. *Columba*. Anon. 1829.

Lesions of semicircular canals. Effects on neurons of anterior column. *Columba*. Soprana, F. 1907.

Secondary degeneration. Includes *Columba*. Singer, J. 1881.

Transection of dorsal roots of spinal nerves. *Columba*. Trendelenburg, W. E. 1906a, b.

Physiology of lumbar cord

Experimental study of lumbar reflexes. *Columba*. *Clementi, A. 1910, 1913.

Motor functions. *Columba*. Singer, J. 1884.

Stimulation producing motor ataxia. *Columba*. Brown-Séguard, C. E. 1863.

DIVISIONS

Coccygeal vestige. *Anas*, *Anser*, *Gallus*, & *Meleagris*. Peyron, A. 1922.

Gray matter

General. Includes *Gallus*. *Clarke, J. L. 1859.

Development. *Gallus*. Ramón y Cajal, S. 1890a, c.

Nucleoli in neurons, development of. *Gallus*. Collin, R. 1906a.

Nuclei

General. *Anas*, *Athene*, & *Corvus*. Sterzi, A. I. 1905. *Columba*. Kölliker, R. A. 1902a. *Dromaeus* [*Dromiceius*]. *Hardesty, I. 1905. *Gallus*. Kölliker, R. A. 1902a; Sterzi, A. I. 1905. *Passer*. Sterzi, A. I. 1905.

Intermedio-lateral column of gray matter. *Anas*, *Columba*, & *Grus*. Takahashi, D. 1913.

Nuclei in lumbar cord. *Columba* & *Gallus*. *Retzius, G. 1902.

Substantia gelatinosa Rolandi, histogenesis of. Sacchi, P. 1889.

Marginal paragriseal column

Books. Text in French. Ramón y Cajal, S. 1911.

Text in German. Krause, R. 1922; Lenhossék, M. 1894, 1895.

Nuclei marginales (Hoffmann's nuclei). For a good account, see English edition by Kappers, Huber & Crosby, pp. 206-210. Kappers, C. U. 1920-21. Includes birds. Nemiloff, A. 1912. *Anas* & *Anser*. Lachi, P. 1902. *Columba*. Kölliker, R. A. 1901, 1902b. *Gallus*. Berliner, K. 1902; Gaskell, W. H. 1889; Gehuchten, A. & Boule, L. 1908; Kölliker, R. A. 1901; Lachi, P. 1902; Shimada, K. 1922. Includes *Gallus*. Terni, T. 1926. *Meleagris*. Lachi, P. 1902. *Passer*. Shimada, K. 1922. *Struthio*. Streeter, G. L. 1904.

Reissner's fibers

General. *Anser*. Mathis, J. 1929.

Development. *Gallus*. Schumacher, S. 1928b.

Lumbar region

Development. *Imhof, G. 1905.

Gray matter. Neurons. *Columba* & *Gallus*. *Retzius, G. 1902.

Multiple canals. Embryo. *Gallus*. Kelsey, H. 1912.

Sinus rhomboidalis

Book. Text in German. Includes *Columba*, *Gallus*, & *Meleagris*. *Stilling, B. 1856.

General. Duval, M. M. 1876; Emmert, A. G. 1811; Gaskell, W. H. 1908; Guillot, N. 1843; Hay, E. A. 1844; *Imhof, G. 1905; Stieda, C. H. 1869a. *Columba*. Barry, M. 1838; Hansen-Pruss, O. C. 1923; Staderini, R. 1896a, b. *Gallus*. Barry, M. 1838; Hansen-Pruss, O. C. 1923; *Kappers, C. U. 1924; *Nicolai, T. W. 1812. *Struthio*. *Streeter, G. L. 1904.

Development. *Imhof, G. 1905. *Columba* & *Gallus*. *Duval, M. M. 1876, 1877; Wetzel, R. 1925. *Passer*. *Duval, M. M. 1876, 1877.

Histology. *Columba*, *Gallus*, & *Passer*. Schaffer, J. 1909, 1910.

Substantia gelatinosa

General. *Columba*, *Gallus*, & *Passer*. Terni, T. 1923b, 1924b.

Histogenesis. *Columba* & *Gallus*. Lachi, P. 1889a.

TRACTS

General. Includes *Columba*. Münzer, E. & Wiener, H. 1910. *Gallus*. Kuwabara, T. 1927b.

Degeneration studies. *Columba*. Kühn, A. & Trendelenburg, W. E. 1911.

Effects of extirpation of semicircular canals. *Columba*. Soprana, F. 1905.

VARIATION

General. *Columba*. Peck, J. I. 1889b.

In case of hereditary ataxia. *Columba*. Hoshino, T. 1919.

PERIPHERAL CEREBROSPINAL NERVOUS SYSTEM

Cerebrospinal ganglia

General. Gehuchten, A. 1892a. *Anas* & *Gallus*. Levi, G. 1908.

Development. *Gallus*. Bombicci, G. 1899; Goldberg, M. 1891; Golovin, E. 1890; Houssay, F. 1891. Include *Gallus*. Beard, J. 1888a; His, W. 1879; Onodi, A. D. 1884.

Structure. Beard, J. 1888a. *Anas* & *Anser*. Smith, E. V. 1913. *Columba*. Holmgren, A. E. 1914, 1915. *Columba* & *Meleagris*. Smith, E. V. 1913.

CRANIAL NERVE GANGLIA

Ectomammillare. Ansalone, G. 1907.

Semilunare (Gasser) of N. trigeminus. *Gallus*. Biondi, G. 1913. Includes *Gallus*. His, W. 1887.

Spirale and vestibulare of N. acusticus. Cajac, R. 1908.

SPINAL (DORSAL ROOT) NERVE GANGLIA

Book. Text in German. *Gallus*. Lenhossék, M. 1894.

Includes birds. Rauber, A. A. 1880c. *Anas*, *Anser*, *Carduelis*, *Columba*, *Corvus*, & *Gallus*. Rawitz, B. 1882. *Columba*. Peck, J. I. 1889b.

Structure. Includes birds. Stienon, L. 1880. *Fringilla*, *Otus*, & *Pyrgita*. Schiff, M. 1854.

Cytology

General. Bergen, F. 1904. *Columba* & *Gallus*. *Timofeevsky, D. I. 1898.

Golgi apparatus. *Gallus*. Sjövall, P. G. 1906.

Mitochondria. Effects of beriberi. *Gallus*. Ma, W. 1925.

Development

General. *Gallus*. Golovin, E. 1890; Lahousse, E. 1885.

Including dorsal root neurons. Gangi, S. 1905.

Cerebrospinal nerves

General. Bazin, Alphonse, 1837. Book. Text in German. Treviranus, G. R. 1820. *Anas* & *Falco*. Ebel, J. C. 1788. *Spheniscus demersus*. Smith, J. W. 1891.

Development. *Gallus*. *Hoven, H. 1910; Marshall, A. M. 1878b; Mitrophanov, P. I. 1891b. Includes *Gallus*. Beard, J. 1888b.

Nerve degeneration. Experimental. *Columba*. Jelgersma, G. 1896.

Regional distribution. Dermatomeres. *Columba*. Deelman, H. T. 1920.

Cranial nerves

Books. Text in English. Dissection view. *Anas*. Harwood, B. K. 1796.

Text in French. Includes birds. Serres, A. E. 1824-26.

Text in German. Include birds. Key, A. & Retzius, G. 1876; Lakjer, T. 1926. *Columba*. Good figures. Wiedersheim, R. E. 1907.

General. Include birds. Hannover, A. 1842; Johnston, J. B. 1905. Birds incidental. Stieda, L. 1870a. *Anas*. Bamberg, C. T. 1842; Budge, J. 1855; *Cords, E. 1904; Rochas, F. 1885c; Stieda, L. 1869a. *Anser*. Bamberg, C. T. 1842; *Cords, E. 1904; Rochas, F. 1885c; Stieda, L. 1869a. *Columba*. Cosmettato, G. F. 1903. *Colymbus*. Bamberg, C. T. 1842. *Corvus*. Bamberg, C. T. 1842; *Bonsdorff, E. J. 1852. *Falco* & *Fulica*. Bamberg, C. T. 1842. *Gallus*. Bamberg, C. T. 1842; *Cords, E. 1904; Gelderen, C. 1924b; Stieda, L. 1869a. Lateral dissection figured. Bernard, C. 1851. *Grus*. Excellent figures. *Bonsdorff, E. J. 1852. *Larus*. Rex, H. 1911. *Meleagris*. Bamberg, C. T. 1842; Schlemm, F. 1834. *Oriolus*. Bamberg, C. T. 1842. *Passer*. Stieda, L. 1869a. Includes *Passer*. Gage, S. P. 1896. *Picus* & *Strix*. Bamberg, C. T. 1842.

Canals and foramina in skull for cranial nerves. Halbertsma, H. J. 1862. *Columbae*. Shufeldt, R. W. 1901d. *Gallus*. Kesteven, H. L. 1926b; Tonkov, V. N. 1900b. *Meleagridae*. Shufeldt, R. W. 1914b. *Meleagris*. Kesteven, H. L. 1926b. *Podasocys montanus*. Shufeldt, R. W. 1884a. *Sturnella*. Shufeldt, R. W. 1888f.

Dissection showing cut ends of cranial nerves in base of cranial cavity. *Meleagris*. Schlemm, F. 1834.

Development

General. *Anas*. Futamura, R. 1907; Wijhe, J. W. 1882-83, 1886. *Gallus*.

*Belogolowy, J. A. 1910b; *Bok, S. T. 1915; His, W. 1879, 1887; Kashchenko, N. F. 1887; *Marshall, A. M. 1878a, 1880. *Larus*. Wijhe, J. W. 1882-83, 1886. Includes *Passer*. Futamura, R. 1907. *Sterna* & *Vanellus*. Wijhe, J. W. 1882-83, 1886.

Ganglia. *Gallus*. His, W. 1887.

CRANIAL NERVES BY NAME AND NUMBER

For nuclei of cranial nerves, see under Brain.

Abducens (VI)

Anatomy and morphology. Bender, O. 1910. Includes *Gallus*. Terni, T. 1922. *Meleagris*. Schlemm, F. 1834.

Development. *Gallus*. Carpenter, F. W. 1906b.

Metamere representation. Includes *Gallus*. Marshall, A. M. 1882.

Accessory (XI)

Anatomy and morphology. Book. Text in French. Bischoff, T. L. 1832. *Corvus cornix*. Meursinge, N. 1851. Includes *Gallus*. Bernard, C. 1851.

Development. Include birds. Chiurugi, G. 1889, 1894.

Physiology. Book. Text in French. Bischoff, T. L. 1832. Includes *Gallus*. Bernard, C. 1851.

Acusticus (VIII)

Anatomy and morphology. Béraneck, E. 1888; Holmes, G. M. 1903; Ramón y Cajal, S. 1908f.

Comparative anatomy. Includes birds. Holmes, G. M. 1903.

Development. *Gallus*. Gray, H. 1850.

Ending in ear. Hasse, C. 1867d.

Ganglia. Ramón y Cajal, S. 1908b.

Vestibular nerve. Influence on motility. Includes *Columba*. Winkler, T. C. 1907.

Facialis (VII)

Anatomy and morphology. Béraneck, E. 1888; Laffont, M. 1885. *Anas* & *Passer*. Kallius, E. 1905.

Chorda tympani branch. Magnien, L. 1885a. *Anas*. Goodrich, E. S. 1915; Platner, F. 1839. Includes *Gallus*. Goodrich, E. S. 1915.

Ganglion geniculi. *Aquila, Gallus, & Meleagris*. Magnien, L. 1885b.

Supply to ear. *Anser & Gallus*. Hasse, C. 1873c.

Glossopharyngeus (IX)

Anatomy and morphology. Bender, O. 1910; Kreidl, A. 1895; Ritzel, —. 1843. *Anas*. Kallius, E. 1905. *Gallus*. Acconi, L. 1881; Bernard, C. 1851; Staderini, R. 1889. *Meleagris*. Staderini, R. 1889. *Passer*. Kallius, E. 1905. *Pavo*. Staderini, R. 1889.

Roots. *Gallus*. Ramón y Cajal, S. 1909.

Hypoglossus (XII)

Anatomy and morphology. Birds incidental. Gaupp, E. 1897. *Anas*. Kallius, E. 1905. *Gallus & Meleagris*. Staderini, R. 1889. *Passer*. Kallius, E. 1905. *Pavo*. Staderini, R. 1889.

Development. Include birds. Chiarugi, G. 1889, 1894. Nuclei. *Cathartes & Fringilla*. Gröbbels, F. 1922a.

Physiology. Many species. Gröbbels, F. 1922a.

Supply to syrinx. *Corvus & Gallus*. Thébault, V. 1896c.

Oculomotorius (III)

Anatomy and morphology. Book. Text in Latin. *Meleagris*. Schlemm, F. 1834.

Development. *Gallus*. *Carpenter, F. W. 1906b.

Physiology. *Columba* incidental. Langendorff, O. 1894.

Olfactorius (I)

See also under **Olfactory organs**.

Anatomy and morphology. Many species. Birds pp. 42–48. Schultze, M. 1862. Includes birds. Book. Text in French. Serres, A. E. 1824–26. Includes *Columba*. Locatelli, P. 1926. *Gallus*. Kölliker, R. A. 1890; Locatelli, P. 1926. *Ramphastos toco*. Owen, R. 1834a.

Development. *Anas & Anser*. *Disse, J. 1897, 1901. *Apteryx*. Parker, T. J. 1892a. *Gallus*. *Disse, J. 1897, 1901; Rossi, U. 1899.

Metameric representation. Includes *Gallus*. Marshall, A. M. 1882.

Origin and termination of fibers. Ramón y Cajal, S. 1890b.

Opticus (II) and Chiasma (II)

Anatomy and morphology. Beaugard, H. 1876b. Includes birds. Deyl, J. 1895; Hannover, A. 1840. *Anas & Anser*. Friant, A. 1874. *Columba*. Cosmettatos, G. F. 1900; Friant, A. 1874; Mayser, P. 1894. *Gallus*. Friant, A. 1874. *Gallus* incidental. Studnicka, F. K. 1897.

Degeneration of optic nerves, chiasma, optic lobes, and other visual structures following extirpation of eyes. *Columba*. Jelgersma, C. 1896.

Development. *Gallus*. Gray, H. 1850; *Szily, A. 1922. Includes *Gallus*. Assheton, R. 1893.

Median root of optic nerve. *Gallus*. Perlia, R. 1889, 1891.

Neurons of optic nerve. *Gallus*. Scaffidi, V. 1906.

Optic chiasma

General. Includes birds. Biesiadcki, A. 1861. *Anas & Anser*. Friant, A. 1874. *Columba*. Beaugard, H. 1876a; Friant, A. 1874; Singer, J. & Münzer, E. 1889. *Gallus*. Beaugard, H. 1876a; Friant, A. 1874; Perlia, R. 1889, 1891. *Strix*. Singer, J. & Münzer, E. 1889.

Decussation of nerve fibers. Birds incidental. Gudden, A. 1879.

Structure. Includes birds. Michel, J. 1873.

Trigeminus (V)

Anatomy and morphology. Béraneck, E. 1886; Laffont, M. 1885; Ritzel, —. 1843. Book. Text in German. Lakjer, T. 1926. *Anas & Passer*. Kallius, E. 1905.

Development. Chiarugi, G. 1887; Van Valkenburg, C. T. 1911a, b.

Distribution in nasal mucosa. *Gallus*. Rubaschkin, W. 1903.

N. mandibularis. Includes birds. Ramón y Cajal, P. 1904b.

Supply to ear. *Anser & Gallus*. Hasse, C. 1873c.

Trochlearis (IV)

Anatomy and morphology. Book. Text in Latin. *Meleagris*. Schlemm, F. 1834.

Development. Chiarugi, G. 1887. *Gallus*. Tello, J. F. 1924b.

Vagus (X)

See also under Autonomic nervous system.

Book. Text in French. Vol. 2, p. 394. Bernard, C. 1858.

General. Bender, O. 1910; *Conrad, R. 1915. *Anas*, *Columba*, & *Gallus*. *Couvreur, E. 1892d. Includes *Gallus*. Bernard, C. 1851.

Development. Include birds. Chirugi, G. 1889, 1894. Includes *Gallus*. Uchida, S. 1929.

Distribution. *Gallus*, *Meleagris*, & *Pavo*. Staderini, R. 1889.

Roots of vagus nerve. *Gallus*. Ramón y Cajal, S. 1909.

Thoracic and cervical portions. *Columba* & *Gallus*. Terni, T. 1924a.

N. laryngeus inferior

General. Acconi, L. 1881.

Relation to aorta. Includes *Gallus* embryo. Brenner, A. 1883.

Physiology

Book. Text in French. Vol. 2, p. 394. Bernard, C. 1858.

General. *Stuebel, H. 1910a. Includes birds. Siefert, E. 1896. *Anas*. Couvreur, E. 1892c, d. *Anser*. Bourgeois, N. 1896. *Columba*. Couvreur, E. 1892c, d; Nikolaides, R. 1914; Schwarzkopf, E. 1908. *Gallus*. Bourgeois, N. 1896; Couvreur, E. 1892c, d; Mangold, E. 1906.

Influence on

Heart. *Anser* & *Gallus*. Einbrodt, P. 1859. *Columba*. *Jürgens, H. 1909. Includes *Columba*. Knoll, P. 1897.

Heart and vasomotor functions. Comparison with mammals. Couvreur, E. 1892b.

Effect of drugs on cardiac vagus. Atropine, pilocarpine, physostigmine. *Gallus*. Gibbs, O. S. 1926.

Respiration. *Couvreur, E. 1890, 1891a, 1892d. *Columba*. *Grober, J. A. 1899.

Stomach action. Nolf, P. 1925b, 1927. *Corvidae*. Mangold, E. 1911b. *Gallus*. Rossi, G. 1905.

Urine secretion. Includes birds. Couvreur, E. 1892a.

Results of cutting vagus nerve

General. *Anas* & *Columba*. *Zander, R. 1879. *Columba*. Knoll, P. 1880.

Cause of death. *Columba* & *Gallus*. Anrep, B. 1880.

Effect on gastric digestion. Couvreur, E. 1891b.

Inhibitory effect of stimulation of central end upon contraction of respiratory muscle. *Gallus*. Meyer, A. L. 1916-17.

Spinal nerves

Books. Text in Dutch. Man, J. G. 1873.

Text in German and English. Kappers, C. U. 1920-21.

Text in German. Barkow, H. C. 1856; Gadow, H. F. 1891c; *Ihering, H. 1878.

General. Marbach, W. 1840. *Chrysotis*. Thuet, M. J. 1838. *Gallus*. *Nicolai, T. W. 1812. *Lorius*. Thuet, M. J. 1838. *Ratitae*. *Gadow, H. F. 1880. *Sittace* [*Ara*]. Thuet, M. J. 1838.

Action in breathing. Intercostal and phrenic nerves. *Anas*. Cavalié, M. 1898a.

Development. Birds incidental. Sagemehl, M. 1882. *Gallus*. Lahousse, E. 1885; Paterson, A. M. 1887. Includes *Gallus*. His, W. 1879.

SPINAL NERVE ROOTS

General. Birds incidental. Ono, N. 1931.

Development. *Gallus*. Fragnito, O. 1907.

Experimental study of functions. *Anser*. Moreau, A. 1860.

Histogenesis of neurons. *Gallus*. *Cameron, J. 1906.

Neurons with ganglion cells in anterior gray column of spinal cord. *Gallus*. Lenhossék, M. 1890.

Segmental distribution. *Sparvoli, R. 1907.

Variation. *Columba*. Peck, J. I. 1889a, b.

Dorsal roots

Development. *Gallus*. Onodi, A. D. 1884.

Effects of cutting dorsal roots on tonus of wing musculature. *Columba*. *Trendelenburg, W. E. 1906a.

Motor neurons. *Gallus*. Gehuchten, A. 1893.

PLEXUSES

Book. Text in German. *Ihering, H. 1878.

General. *Fürbringer, M. 1879, 1888, 1902; Haij, B. 1887; Haswell, W. A. 1879. *Alca*, *Eudypies*, *Mergulus*, & *Mormon*. *Carlsson, A. 1884.

Development. *Gallus*. Paterson, A. M. 1887.

Brachial plexus. *Anas*. Selenka, E. 1870a. *Coracornithes*. Buri, R. O. 1900. *Corvus cornix*. Meursinge, N. 1851.

Sacral plexus. Many species. Mi-vart, S. J. & Clarke, R. 1879.

VARIOUS SPINAL NERVES

First cervical nerve. Include birds. Chiarugi, G. 1889, 1894.

Nn. intercostales. *Anas*. Cavalié, M. 1898a.

N. obturatorius. Relations. *Corvus*, *Larus*, & *Podiceps*. Levin, B. 1926.

Nn. occipitalis. Gaupp, E. 1897.

N. phrenicus. *Anas*. Cavalié, M. 1898a.

Nerves of pelvic region. *Gallus*. Toit, P. J. 1913.

Nerves of thigh. *Gallus*. Romer, A. S. 1927.

Nerve endings

Books. Text in German. Gadow, H. F. 1891d. Includes birds. Key, A. & Retzius, G. 1876. *Anas*. Rauber, A. A. 1867.

General. Dogiel, A. S. 1905. Includes birds. Pacini, F. 1836. *Gallus* incidental. Botezat, E. 1908.

IN MUSCLE

In cardiac muscle. *Columba*. Hosi, T. 1926.

In striate muscle

General. *Columba* & *Passer*. Rossi, A. 1883.

Development. Excellent figures. Includes *Gallus*. *Tello, J. F. 1922a.

Efferent nerve endings in striated muscle

General. Include birds. Gerlach, J. 1873; Rouget, C. 1862c; Trinchese, S. 1885. Includes *Columba*. Engelmann, T. W. 1863a. Includes *Gallus*. Rouget, C. 1862a.

Hypolemmal endings. *Sturnus*. Boeke, J. 1910.

Motor end plates

General. *Columba*. Stefanelli, A. 1914. Includes *Columba*, *Gallus*, & *Sterna*. Boeke, J. 1911.

Development of terminations and plates in striate muscle. *Gallus*. Cavalié, M. 1904.

Histogenesis of motor end plates. Tello, J. F. 1922a.

Proprioceptive nerve endings

General. *Columba* & *Passer*. Rossi, A. 1883. Includes *Gallus*. Excellent figures. Tello, J. F. 1922a.

Innervation of muscle spindles. *Columba*, *Corvus*, & *Gallus*. Kura, N. 1929.

SENSORY (AFFERENT) NERVE ENDINGS

Epithelial. Includes birds. Boeke, J. 1883. *Anas*. Szymonowicz, L. 1896; *Van der Velde, E. 1909.

Glands. *Botezat, E. 1906a, 1910b. Olfactory mucosa. Embryo. *Gallus*. Rubaschkin, W. 1907.

Periosteum. *Botezat, E. 1906a.

Sensory nerve ending. Relations to neuron theory. *Dogiel, A. S. 1904, 1905.

Tendons. *Columba* & *Passer*. Rossi, A. 1883. Include birds. Pansini, S. 1888, 1891.

Auditory nerve endings in ear

General. Hasse, C. 1867d.

Middle ear. *Columba*, *Cypselus*, *Fringilla*, *Gallus*, *Passer*, *Scolopax*, & *Tinnunculus*. Vitali, G. 1911b, 1911-12, 1914, 1920, 1921.

Beak region nerve endings

General. *Anas*. Szymonowicz, L. 1896; Tamura, —. 1922. *Passer*. Heidecke, E. 1897. *Platalea*. Jobert, C. 1873c.

Corpuscles of Ruffini in tongue. *Conurus*. *Ducceschi, V. I. 1912.

General sensation corpuscles of beak and mouth including tongue

Book. Text in German. Merkel, F. S. 1880.

General. *Botezat, E. 1904, 1906a, b; Crevatin, F. 1902; Izquierdo, V. 1879; Kniasef, N. D. 1882. Many species. Jobert, C. 1872b. Includes birds. Tafani, A. 1879. *Anas*. Acloque, A. 1913; Asper, G. 1876; Merkel, F. S. 1878; Ranvier, L. A. 1877. Fringillidae. Botezat, E. 1911.

Development. *Anas*. Asp, G. A. 1885.

Function of supporting cells. Botezat, E. 1910b.

Palatal region. *Anas* & *Anser*. *Geberg, A. 1893; Leydig, F. 1854a.

Grandry's corpuscles (including Merkel's corpuscles)

General. Carrière, J. W. 1882; *Dogiel, A. S. 1904, 1905; *Dogiel, A. S. & Willanen, K. 1900; Ihlder, D. 1870; Jobert, C. 1872a. Includes birds. Merkel, F. S. 1875. *Anas*. Dostoiwsky, A. 1886; *Geberg, A. 1893; Heringa, G. C. 1920; Hesse, F. 1878; Izquierdo, V. 1879; Krause, W. 1881a; Lawrentjew, B. J. 1926; Tamura, —. 1922. Anatidae. *Botezat, E. 1906a, 1907a; *Dogiel, A. S. 1904; Szymonowicz, L. 1895. *Anser*. Dostoiwsky, A. 1886; *Geberg, A. 1893. *Anserinae*. Nowik, N. 1910. *Columba*. *Botezat, E. 1906a, 1907b. *Columbus*. *Dogiel, A. S. 1904. *Corvus* & *Pyrhula*. Szymonowicz, L. 1926.

Development. *Anas*. *Heringa, G. C. 1917, 1920; Szymonowicz, L. 1896.

Effects of cutting nerves, of cocain, and of mechanical stimulation. Gasiorowski, N. 1902.

Measurements. *Anas*. Krause, W. 1881a.

Nerve fiber plexus. Sfameni, P. 1900.

Structure. Kultschitzkij, N. K. 1883. *Anas*. Heringa, G. C. 1920; Szymonowicz, L. 1896; *Van der Velde, E. 1907, 1909.

Lamellar corpuscles (including Herbst, Pacinian, Key-Retzluis, Vater, and Vater-Pacinian corpuscles of various authors) in

Extremities. Jobert, C. 1872b.

Joint capsule. *Columba*. Rauber, A. A. 1865.

Ligaments. *Columba*. Rauber, A. A. 1865.

Periosteum. Pansini, S. 1891. *Columba*. Rauber, A. A. 1865.

Uropygeal gland. *Cuculus*, *Grus*, *Netta*, *Passer*, & *Spheniscus*. Paris, P. 1912b, 1913.

Beak region including mouth and tongue

Book. Text in German. Includes birds. Herbst, G. 1848. *Gallus*. Rauber, A. A. 1867.

General. *Botezat, E. 1906a; Cattani, G. 1884, 1885; Ihlder, D. 1870; Jobert, C. 1872a; Leydig, F. 1854b; Tamura, —. 1922. Many species. Jobert, C. 1872b; Will, J. G. 1850. Include birds. Kölliker, R. A. 1854; Merkel, F. S. 1875. Birds incidental. Jobert, C. 1872a.

Anas. Carrière, J. W. 1882; Hesse, F. 1878; Hoyer, H. 1864; Izquierdo, V. 1879; Szymonowicz, L. 1896. Includes *Anas*. Grandry, —. 1869. Anatidae. *Dogiel, A. S. 1904. *Anser*. Leydig, F. 1854a. *Columba*. Botezat, E. 1907b; Engelmann, T. W. 1863b; Hoyer, H. 1864; Rauber, A. A. 1865. *Columbus*. *Dogiel, A. S. 1904. Fringillidae. Botezat, E. 1907a, 1911. *Iynx*. Jourdan, E. 1890. *Meleagris*. Hoyer, H. 1864. *Picus*. Ludwig, F. 1884a. *Psittacus*. Goujon, E. 1869b. *Scolopax*. *Clara, M. 1925. *Scolopax rusticola*. Leydig, F. 1868.

Development. *Anas*. *Heringa, G. C. 1917.

Histology. *Anas*. Ciaccio, G. V. 1871; *Van der Velde, E. 1907, 1909. Include *Anas* & *Anser*. Dogiel, A. S. 1899, 1905. *Columba*. Ciaccio, G. V. 1871. *Gallus* & *Passer*. Sala, G. 1901. *Scolopax*. *Clara, M. 1925.

Measurements and counts. Many species. Herbst, G. 1851.

Physiology

Experimental study of lamellar corpuscles. *Anas* & *Columba*. Ciaccio, G. V. 1871. *Gallus*. Cattani, G. 1885.

Functions. Ciaccio, G. V. 1871; *Schildmacher, H. 1931.

NERVE ENDINGS IN OTHER ORGANS

Esophagus and stomach. Malischeff, N. 1897.

Nerve endings in testis. Includes *Gallus*. Cavalié, M. 1902.

(SYMPATHETIC) AUTONOMIC NERVOUS SYSTEM

Books. Text in French. Piégu, A. 1846.

Text in German. Vogt, C. C. & Yung, E. 1888-94. Many species. Gadow, H. F. 1891d.

General. Emmert, A. G. 1811; Mitchell, P. C. 1901c. Many species. Emmert, A. G. 1812; *Marage, G. R. 1889. *Anas* & *Anser*. Weber, E. H. 1817. *Anser cinereus*. Kolossow, N. G. & Sabussow, G. H. 1929. *Astur*. Pisskunoff, N. N. 1911. *Columba*. Kolossow, N. G. & Sabussow, G. H. 1929. *Columba palumbus*. Thébault, V. 1896a. *Corvus*. Pisskunoff, N. N. 1911. *Corvus cornix*. Jung, R. A. 1858. *Gallus*. Mangold, E. 1906; Weber, E. H. 1817. *Garrulus glandarius*. Thébault, V. 1896f. *Pica*. Pisskunoff, N. N. 1911.

Ganglia in gland ducts. *Columba* & *Gallus*. Manz, W. 1862.

Innervation of skeletal muscle. Botezat, E. 1909b. *Larus*. Hunter, J. I. 1924. *Sturnus*. Boeke, J. 1913.

Relations between thoracico-lumbar sympathetic nervous system and N. vagus. Thébault, V. 1898. *Ara* & *Conurus*. Thébault, V. 1896b. *Gallus*. Mangold, E. 1906. *Sturnus*. Thébault, V. 1896b.

DEVELOPMENT

General. Include birds. Fusari, R. 1892; His, W. 1892b; Kuntz, A. 1910a; Van Campenhout, E. 1930b. *Columba*. Ciaccio, C. 1906a. *Gallus*. Abel, W. 1910, 1912; Ciaccio, C. 1906a; Goormaghtigh, N. 1924; *Kuntz, A. 1910b; *Kuntz, A. & Batson, O. V. 1920; Müller, E. & Ingvar, S. 1923; Nedzwetzki, W. K. 1898; *Tello, J. F. 1925; Uchida, S. 1927; Van Campenhout, E. 1931. Includes *Gallus*. Bruni, A. C. 1916; Fusari, R. 1892; Onodi, A. D. 1886; Riquier, G. C. 1920; Schenk, S. L. & Birdsall, W. R. 1880. *Passer*. *Subba, R. A. 1923.

Abdominal autonomic nervous system. Includes *Gallus*. *His, W. Jr. 1897.

Experimental study. *Gallus*. *Kuntz, A. 1926; Van Campenhout, E. 1932. Includes *Gallus*. *Kuntz, A. 1922.

Origin and evolution of autonomic nervous system. *Passer*. Mazzarelli, G. F. 1894. Includes birds. Kuntz, A. 1911.

Vidian nerve. Many species. Rochas, F. 1885a.

GANGLIA

Structure. *Gallus*. Huber, G. C. 1899; Speciale, F. 1915.

Vagus nerve ganglia in thorax. *Columba* & *Gallus*. Terni, T. 1924a.

Cytology

General. *Columba* & *Gallus*. *Timo-feevsky, D. I. 1898.

Development. Ciaccio, C. 1905. *Gallus*. Goldberg, M. 1891.

INNERVATION OF VARIOUS ORGANS

Glands of mouth and nasal chamber. Includes *Anas*, *Anser*, & *Gallus*. Gaupp, E. 1888.

Alimentary canal

General. Shin, F. 1930. *Gallus*. *Nolf, P. 1925c, 1927.

Components. *Gallus*. *Nolf, P. 1928.

Crop. *Columba* & *Gallus*. Ihnen, K. 1928.

Ganglion of Remak. His, W. Jr. 1897; Kuntz, A. 1910b; Onodi, A. D. 1886.

Intestine. Nolf, P. 1934; Thébault, V. 1896d. *Corvus*. Thébault, V. 1895b, 1896e. *Gallus*. Szantroch, Z. 1927. *Garrulus* & *Pica*. Thébault, V. 1896e.

Intestinal nerve of Remak. Abel, W. 1910.

Mesenteric nerves. *Picus viridis*. Magendie, F. 1819d.

Stomach

General. *Anas*, *Columba*, & *Gallus*. Doyon, M. 1894b. *Gallus*. Nolf, P. 1925b, 1927.

Physiology. *Anas*, *Columba*, & *Gallus*. Doyon, M. 1894b.

Splanchnic components. Function. Includes birds. Book. Text in French. Piégu, A. 1846.

Blood vessels (Vasomotor nerves)

Book. Text in German. Includes birds. Tigerstedt, R. A. 1921-23.

General. Stuebel, H. 1910a, b.

Eye

Book. Text in Latin. Schlemm, F. 1834.

Ciliary muscle. Boeke, J. 1915, 1916a, b; *Melkich,—. 1895. *Columba*. *Geberg, A. 1884; Trautvetter, D. 1866. *Gallus*. Trautvetter, D. 1866.

Oculomotor nerve. Physiology. *Columba* incidental. Langendorff, O. 1894.

Ciliary nerves

General. Include birds. Knox, R. 1824; Muck, F. 1815. *Anas* & *Anser*. Holtzmann, H. 1896. *Columba*. Holtzmann, H. 1896; Zeglinski, N. 1885. *Gallus*. Holtzmann, H. 1896; Seto, H. 1929; Zeglinski, N. 1885.

Components. *Gallus*. Seto, H. 1929.

Iris

General. Boeke, J. 1915, 1916a, b.

Innervation of iris. Grünhagen, A. W. 1887; *Melkich,—. 1895; Zeglinski, N. 1885. *Columba*. Geberg, A. 1884.

Feather muscles

General. *Anas*, *Columba*, & *Gallus*. *Langley, J. N. 1902, 1904.

Pennamotor center

Cerebral cortex center for feather muscle innervation. *Anas* & *Gallus*. Weber, E. 1906.

Forebrain. Experimental lesions. *Columba*. Rogers, F. T. 1921b.

Medulla center. *Gallus*. King, C. H. 1921.

Heart

General. Hosi, T. 1926; Kahn, R. H. 1915. Birds incidental. Wagner, R. 1854. *Anas*. Paton, D. N. 1912; Ssinelnikow, R. 1928. *Anser* & *Columba*. Ssinelnikow, R. 1928. *Corvus* & *Gallinula*. Thébault, V. 1895a. *Gallus*. Ssinelnikow, R. 1928. Includes *Gallus*. Kasahara, I. 1928. *Linaria* & *Sturnus*. Thébault, V. 1895a.

Development. *Gallus*. *His, W. Jr. 1893.

Intracardiac nerves. Many species. Kondratjew, N. S. 1926.

Physiology. Stuebel, H. 1910b. *Columba*. Wagner, R. 1860.

Ganglia of heart

General. *Columba*, *Falco*, *Gallus*, *Muscicapa*, & *Passer*. Schklarewski, A. 1872b.

Development. Includes *Gallus*. His, W. 1892b.

Reproductive organs

General. Weidenbaum, G. 1894.

Erectile tissue in genitalia. *Anas*. Müller, R. 1908.

Ganglion cells in ovary. *Gallus*. Ganfini, C. 1907b.

Ovary and oviduct. *Gallus*. Johnson, J. S. 1925.

Respiratory organs

Book. Text in French. Sappey, M. P. 1846.

General. *Grober, J. A. 1899. Many species. Emmert, A. F. 1812.

Air sacs used in gular vocalization. *Bonasa*, *Meleagris*, & *Tetrao*. Stockwell, G. A. 1888.

Lungs. Lühe, M. 1900.

Syrinx and trachea. *Gallus*. Thébault, V. 1896g.

Spleen

General. Monti, R. 1898a.

Suprarenal glands

Endings in capsule. Giacomini, E. 1898.

Cervical sympathetic nervous system

General. *Conrad, R. 1915; Terni, T. 1924a. *Anas*. Langley, J. N. 1904; Rochas, F. 1885c. *Columba* & *Gallus*. Langley, J. N. 1904.

Superior cervical ganglion. Book. Text in French. Bischoff, T. L. 1832. Includes birds. Rochas, F. 1887.

Cranial (parasympathetic) autonomic nervous system

See also under Cranial nerves: Vagus nerve.

General. Laffont, M. 1885. *Anas*. Rochas, F. 1885b. *Anser*. Rochas, F. 1885b, 1886. *Meleagris*. Schlemm, F. 1834.

CRANIAL GANGLIA

Development. Includes *Gallus*. Kuntz, A. 1914.

Sphenopalatine ganglion. Sainton, P. & Simonnet, H. 1929.

Ciliary ganglion

General. *Carpenter, F. W. 1911; Erchia, F. 1894. Includes birds. Muck, F. 1815. Birds incidental. Krauss, W. 1881b. *Anas*. Budge, J. 1855; Holtzmann, H. 1896; *Lenhossék, M. 1911a; Rochas, F. 1885b; *Zeglinski, N. 1885. *Anser*. Budge, J. 1855; Holtzmann, H. 1896; Rochas, F. 1885b; *Schwalbe, G. A. 1879a, b. *Columba*. Holtzmann, H. 1896; Langendorff, O. 1900; *Lenhossék, M. 1911a; Pavlov, V. 1915; *Zeglinski, N. 1885. Includes *Columba*. Beauvieux, — & Dupas, J. 1926. *Gallus*. Holtzmann, H. 1896; *Lenhossék, M. 1911a; Seto, H. 1929; *Zeglinski, N. 1885. Excellent figures. *Lenhossék, M. 1910. *Meleagris*. *Lenhossék, M. 1911a. *Strix*. *Schwalbe, G. A. 1879a, 1879b.

Components of ciliary ganglion. *Gallus*. Seto, H. 1929.

Development. *Gallus*. *Carpenter, F. W. 1906b.

Histology. *Columba*. Jegorow, J. 1887a.

Physiology. *Columba*. Jegorow, J. 1887a; Langendorff, O. 1894, 1900. *Gallus*. *Zeglinski, N. 1885.

Physiologic experimentation

General. Jegorow, J. 1890.

Action of blood plasma on ansa intestinalis. *Gallus*. Nolf, P. 1922.

Curare, effect of. *Columba*. Vulpian, E. F. 1865.

Fluctuations in tonus. *Gallus*. Shiraki, T. 1925.

Stimulation of vagus and splanchnic nerves. *Anas*, *Columba*, & *Gallus*. Doyon, M. 1894b.

Ablation of

Cervical and thoracic ganglia. Effect on tonus of flight muscles. *Columba*. Nagano, T. 1924.

Superior cervical ganglion. Michon, J. 1865.

Diencephalon center for regulation of

Blood pressure. Experimental. *Columba*. Rogers, F. T. 1920b.

Body temperature. *Columba*. Rogers, F. T. 1919b, 1921a.

Plexuses

Mesenteric plexus ganglia. *Columba* & *Gallus*. Rivolta, S. 1880.

Submucous. Development. *Gallus*. Meiklejohn, S. J. 1908; Van Campenhout, E. 1930a.

Vesical plexus. Embryo. *Gallus*. Szantroch, Z. 1929.

Celiac plexus

Development and histology. Includes *Gallus*. Goormaghtigh, N. 1913.

Ganglion coli. *Gallus*. Minot, C. S. 1900b.

Myenteric plexus

General. *Gallus*. Mangold, E. 1906. Includes *Gallus*. Tello, J. F. 1924a.

Development. *Gallus*. Meiklejohn, S. J. 1908; Van Campenhout, E. 1930a.

Thoracico-lumbar (sympathetic) autonomic nervous system

General. *Anas*, *Anser*, *Gallus*, *Phasianus*, & *Numida*. *Marage, G. R. 1887.

Influence on gastric motility. Nolf, P. 1925b.

Preganglionic neurons. *Anas*, *Columba*, & *Gallus*. Langley, J. N. 1904; Terni, T. 1923a. *Hirundo*, *Passer*, & *Troglodytes*. Terni, T. 1923a.

Splanchnic components. Includes birds. Piégu, A. 1846.

Thoracic ganglia. *Columba* & *Gallus*. Terni, T. 1924a.

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A limited number of references have been included in this section. See also under Biochemistry, Economic ornithology, Food, Poultry culture, and Vitamins.

Book. Text in German. Abderhalden, E. 1920.

General. Lee, A. R. 1911a; Smith, C. D. & Brooks, C. S. 1899. *Columba*. Abderhalden, E. & Schmidt, L. 1920; Funk, C. & Collazo, J. A. 1925; Mangold, E. 1927b; Randoin, L. & Simonnet, H. 1924a, b. *Gallus*. Bethke, R. M., Kennard, D. C., & Kik, M. C. 1925;

Hendricks, W. A., Jull, M. A., & Titus, H. W. 1932; Lehmann, F. 1904; Lewis, H. R. 1919; Mangold, E. 1927b; Mitchell, H. H. 1924; Moore, P. H. 1916; Mussehl, F. E. & Bancroft, P. M. 1925b; Philips, A. G. 1916b, 1918a; *Völtz, W. & Yakuwa, G. 1909. Capons. Wheeler, W. P. 1893a.

Food substances. *Columba*. Abderhalden, E. 1918, 1921b.

Glycogen reserve lacking. Bird can survive without food only through night. *Fringilla bengalus*. Lapique, L. & Lapique, M. 1911.

Nutrition of the embryo

General. Prévost, J. L. & Morin, A. 1846. Includes birds. Vicq d'Azyr, F. 1799. *Gallus*. Dareste, C. 1876e; Emrys-Roberts, E. 1908; Leveillé, J. B. 1800.

Absorption rate of reserve yolk in chick. *Gallus*. Schenk, S. L. 1897; Schilling, S. J. & Bleecker, W. L. 1928.

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Egg white. Absorption. *Gallus*. Bywaters, H. W. 1913c.

Enzymes. *Gallus*. Tallarico, G. 1908.

Loss of weight of fertile and sterile eggs during incubation. *Gallus*. Bywaters, H. W. & Roué, W. B. 1913.

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Ultra-violet light effects. *Gallus*. Murry, J. C., Little, J. C., & Bovie, W. T. 1924.

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Feathers. Poupart, F. 1732.

Pecten of eye. *Gallus*. Mann, I. C. 1924.

Suprarenal gland. *Columba*. Vincent, S. & Hollenberg, M. S. 1920.

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In growth. *Gallus*. Mussehl, F. E., Hill, R. S., Blish, M. J., & Ackerson, C. W. 1930.

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Metabolism. Effect of cereals and vitamins A and D. *Gallus*. King, E. J. & Hall, G. E. 1931.

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Alterations of bone in feeding fat. *Gallus*. Mori, Suzushi 1923.

"Artificial" enzymes. *Gallus*. Holst, W. F. 1926.

Ash and protein factors. *Gallus*. Lewis, H. R. 1915a.

Comparison of heated and unheated bran and yeast for normal birds and birds fed on polished rice. *Columba*. Abderhalden, E. 1922.

Exclusively carnivorous diet. *Columba*. Holmgren, F. 1867. *Gallus*. Schimanski, H. 1879; Watson, C. 1904.

Flesh and grain diets compared. *Anas*. Weiss, G. 1901. *Gallus*. Ghigi, A. 1919.

Fluorine effects. *Gallus*. Hauck, H. M., Steenbock, H., Lowe, J. T., &

Halpin, J. G. 1933; Kick, C. H., Bethke, R. M., & Record, P. R. 1933.

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Glycine administration in diet deficient in Vitamin B. *Columba*. Kon, S. K. 1927b.

Glycogen content of liver when diet is deficient in hydro-soluble factor B. *Columba*. Randoin, L. & Lelesz, E. 1925.

Heavy grain feeding. *Gallus*. Hannas, R. R. 1924.

Inadequate rations, effects of. *Gallus*. Hogan, A. G., Shrewsbury, C. L., & Kempster, H. L. 1929a, b.

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General. Magnan, A. 1914b.

Forced feeding. Effect on histology of liver, spleen, kidneys, and digestive tract of normal and castrated birds. *Gallus*. Yosikawa, M. & Tomisima, R. 1932.

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INTESTINE

General. Magnan, A. 1910a, b, 1912a.

Cecum. Magnan, A. 1913e.

Dietary and environmental factors. Effect on pH. *Gallus*. Mussehl, F. E., Blish, M. J., & Ackerson, G. W. 1933.

VARIOUS DIET EFFECTS ON

Body weight and function. Book. Text in French. La Riboisière, J. 1910.

Fecundity. *Anas*. Magnan, A. 1912b, m.

FAULTY NUTRITION

Effects of feeding corn exclusively. *Gallus*. Schimanski, H. 1879.

Effects of polished rice. *Columba*. Danysz, M. & Koskowski, W. 1922.

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Weights of liver in birds when diet lacks starch. Magnan, A. 1912i.

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See also under Pathology.

Book. Text in English. McCarrison, R. 1921.

General. *Columba*. McCarrison, R. 1919a, b.

Effect of rachitic diets. *Gallus*. Massengale, O. N. 1929a.

Leg weakness. *Gallus*. Miller, R., Dutcher, R. A., & Kandel, H. C. 1929.

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Egg yolk and chicken fat used. *Gallus*. Henderson, E. W. 1933.

Salmon oil. Davis, D. E. & Beach, J. R. 1928.

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Feather development. *Gallus* & *Streptopelia*. Riddle, O. 1908a, b.

Intestine of deficiency in food factors. McCarrison, R. 1919a.

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Alfalfa products. *Gallus*. Heywang, B. W. 1933.

Coefficients of digestibility. *Gallus*. Heller, V. G., Morris, L., & Shirley, H. E. 1930.

Eggs as food. Chemical consideration. George, H. 1886.

Fat in relation to other food elements. *Gallus*. Reggiani, E. 1914.

Lactose utilization. *Gallus*. Hamilton, T. S. & Card, L. E. 1924.

Mineral requirement in growth. *Gallus*. Kaupp, B. F. 1918b.

Nitrogenous and carbonaceous rations. *Gallus*. Stewart, J. H. & Atwood, H. 1899c.

Oyster shells for laying hens. *Gallus*. Wheeler, W. P. 1892b.

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Deficiencies of corn. *Gallus*. Mussehl, F. E., Calvin, J. W., Halbersleben, D. L., & Sandstedt, R. M. 1921; Mussehl, F. E., Hill, R., & Rosenbaum, J. A. 1926a.

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General. *Gallus*. Morrison, J. K. 1913.

Availability of nitrogen in cottonseed meal and beef scraps. Hartwell, B. L. & Lichtenthaler, R. A. 1914.

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Comparison of vegetable and animal proteins. *Gallus*. Moore, P. 1919.

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General. *Gallus*. Philips, A. G. 1920; Schoppe, W. F. 1923.

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Sources. *Gallus*. Martin, J. H. 1925.

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Corn as source of proteins. Ackerson, C. W. & Blish, M. J. 1926.

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Growth values of proteins from commercial animal products. Prange, R. W., Carrick, C. W., & Hauge, S. M. 1928.

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Effects of adding Vitamin B to diet. *Columba* & *Gallus*. Scheunert, A. & Schieblich, M. 1927a, b.

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Grit starvation. *Lagopus scoticus*. Book. Text in English. Wilson, E. A. 1911a.

Young birds live on their own fat for months after being abandoned by parents. *Diomedea*. Andersson, C. J. 1866.

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Blood pressure. *Columba*. Rogers, F. T. 1920b.

Body temperature. *Columba*. Rogers, F. T. 1919b.

Sex characters. *Gallus*. Martino, G. 1926b.

Sex ratio. *Gallus*. Field, G. W. 1901a.

Weight of body. *Columba*. Nisimura, G. 1930.

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General. *Columba*. Heumann, G. 1850.

Alterations in striped muscle in inanition. *Columba* & *Corvus*. Eichhorst, H. L. 1879.

Suprarenal glands. *Columba*. Vincent, S. & Hollenberg, M. S. 1920.

Testis. *Columba*. Marrian, G. F. & Parkes, A. S. 1928.

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Pancreas. Includes *Anas* & *Columba*. Vincent, S. & Thompson, F. D. 1907.

VARIATION IN NUTRITIONAL EFFECTS ON

Egg size and proportions. Goebel, H. 1903.

Plumage. *Columba*. Pribyl, L. 1889.

OLFACTORY ORGANS

See also under **Brain, Nervous system, and Smell.**

Books. Text in English. Owen, R. 1866-68. Includes birds. Washburn, M. F. 1926. Good dissection view. *Meleagris*. Harwood, B. K. 1796.

Text in French. Ramón y Cajal, S. 1911.

Text in German. Edinger, L. 1904-08. Many species. Gadow, H. F. 1891d. Includes olfactory sense organs. Plate, L. H. 1924. *Columba*. Krause, R. 1922.

Text in Latin. Includes birds. Scarpa, A. 1789.

General. Include birds. Dieulafé, L. 1904; Peter, K. 1902. Many species. Strong, R. M. 1911b, 1913; Technau, G. 1936. *Apteryx*. Gurney, J. H. Jr. 1922a. *Apteryx* incidental. Smith, G. E. 1896. *Aquila*. Gurney, J. H. Jr. 1922a. *Cathartes*. Owen, R. 1837. *Columba*. Münzer, E. & Wiener, H. 1898. *Meleagris*. Hill, A. 1905; Owen, R. 1837. *Passer*. Gage, S. P. 1896. *Puffinus tenuirostris*. Wood Jones, F. 1937.

Absence of fornix first described. Willis, T. 1664.

Bulbs, olfactory. In birds the olfactory bulbs are saddled on the olfactory lobes, as a formatio bulbaris (Edinger

1904-08. Vol. 2, p. 253). *Ramphastos toco*. Book. Text in English. Gould, J. 1833-35.

Development. *Gallus*. Cohn, F. 1903; Marshall, A. M. 1879b; Preobrashchensky, S. S. 1892. *Puffinus tenuirostris*. Wood Jones, F. 1937.

Relation of olfactory organs to soaring flight. McKechnie, W. E. 1923.

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Tracts. *Columba*. Münzer, E. & Wiener, H. 1898.

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General. Ramón y Cajal, S. 1911. Includes birds. Exner, S. 1872. Includes many species. Schultze, M. 1862.

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Distribution. Dieulafé, L. 1904. *Gallus*. Preobrashchensky, S. S. 1892.

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General. *Apteryx*. Durward, A. 1932. *Aquila*. Herrick, C. J. 1893. *Fulmarus glacialis*. Klinckowström, A. 1890. *Hydrochelidon*, *Pelicanus*, & *Philohela*. Herrick, C. J. 1893.

Histology. *Columba*. Schüpbach, P. 1905.

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Included here is a very limited series of references to publications dealing with birds' eggs from the standpoint of the oologist.

Books. Text in Danish. Denmark. Koefoed, A. 1926.

Text in Dutch. The Netherlands. Pelt Lechner, A. A. 1910-13.

Text in English. Asia. India. Baker, E. C. 1932-35. Australia and

Tasmania. North, A. J. 1901-14.
Europe. Jourdain, F. C. 1906-09.
British Isles. Coward, T. A. 1920;
Hewitson, W. C. 1842-46; Poynting,
F. 1895-96. Germany. Naumann,
J. F. & Buhle, C. A. 1818-28. North
America. Bendire, C. E. 1892-95;
*Davie, O. 1898; Reed, C. A. 1904.

Text in French. Europe. Lefèvre,
A. A. 1875.

Text in German. Thienemann, F.
A. 1845-56. Europe. Naumann, J.
F. 1905; Rey, J. G. 1889-1905. Illus-
trations of eggs in color. Friderich,
C. G. 1923; *Thienemann, F. A. 1845-
56. Palearctica. *Krause, G. A.
1905-13. Number of eggs in set.
Tiedemann, F. 1810-14.

Text in Italian. Italy. Zinanni,
G. 1737.

Text in Latin. Europe. *Klein,
J. T. 1766.

Text in Polish. Poland. Tacza-
nowski, W. 1862.

General. Giersberg, H. 1921;
Hartert, E. J. 1890; Kutter, O. F.
1889; Marchand, A. 1863; Schuster,
M. J. 1878.

Various regions. Europe. Vian, J.
1886. Lake Nyasa region. Paget-
Wilkes, A. H. & Sladen, A. G. 1930.
Nigeria. Jourdain, F. C. 1935. South
America. Brazil. Euler, C. 1900.

Casuarus. Rothschild, W. 1901.
Cuculidae. Baker, E. C. 1906. *Cucu-
lus*. Latte, O. H. 1902b; Snell, F. H.
1859. *Falco p. peregrinus*. Allen, J. A.
1866. *Parus*. Heim de Balsac, H.
1929b.

Catalogue of collection. Des Murs,
M. A. 1842.

Care of eggs in collection. Fleury,
E. 1920.

Comparison of eggs of birds and
reptiles. Shufeldt, R. W. 1916b.

Effort to identify indistinguishable
eggs of different species. Rzehak, E. C.
1893a.

Form of eggs. Many species.
Moquin-Tandon, C. H. 1859.

Loss of weight by evaporation of
moisture. Bunyard, P. F. 1918.

Molds and bacteria on egg collec-
tions. Kennard, F. H. 1921.

Number of eggs in set or clutch.
Many species. Moquin-Tandon, C. H.

1859; Serres, A. E. 1840. Book. Text
in German. Tiedemann, F. 1810-14.

Ratio of major and minor axes of
eggs. Hoxie, W. 1886c, 1888a.

Resemblance of eggs of *Cuculus* to
those of species parasitized. Wachs,
H. 1922b.

Shapes of eggs. Mathematical analy-
sis. Mallock, A. 1925.

Significance of oology for ornithology.
Many species. Thienemann, F. A.
1846.

Size of eggs. Strigidae. Wend-
landt, —. 1913.

Spiral pattern in markings of eggs.
Altum, B. 1864.

COLOR OF EGGS

General. Many species. Moquin-
Tandon, C. H. 1859. British birds.
Fox, W. S. 1899a. Jungle fowl.
Gallus. Lotsy, J. P. 1920.

Anomalies. Schmidt, R. 1920.

Significance of egg color. Many
species. Pässler, C. W. 1860.

Viewed in ultraviolet light. Schön-
wetter, M. 1932.

VARIATION

General. Rzehak, E. C. 1890, 1893b.

Color of eggs. Hewetson, H. B.
1892; Napier, C. O. 1868b. Palearctic
birds. Jourdain, F. C. 1905a.

Shape of eggs. Hewetson, H. B.
1892; Napier, C. O. 1868b. Cause.
Seeböhm, H. 1893a.

Size of eggs. Napier, C. O. 1868b.

ORIENTATION

Publications dealing with the ability
of birds to find their way and to return
to breeding or feeding places; also
"position sense."

Books. Text in English. Includes
birds. Rabaud, E. 1928. *Columba*.
Whitman, C. O. 1919a.

Text in French. *Columba*. Gall,
F. J. 1810-19.

Text in German. Includes birds.
Hilzheimer, M. & Haempel, O. 1913.

General. Blatz, C. 1907b; Bonnier,
P. 1898; Brewster, W. 1924; Buy-

tendijk, F. J. 1921; Cooke, W. W. 1904c, 1915a; Dewar, J. M. 1915b; Dewitz, J. 1901; Eckardt, W. R. 1919d; Gunther, E. 1914; Hachet-Souplet, P. 1902; Löns, R. 1907; Loubet, J. 1921; Lucanus, F. K. 1921a; Martorelli, G. 1892; Meise, W. 1933; Möbius, K. A. 1882; Wachs, H. 1924; Weismann, F. L. 1878. Include birds. Brown, F. J. 1870; Franz, V. 1913b; Anon. 1883a. Migrating birds. Gröbbels, F. 1928; Jenner, E. 1826; Lampert, A. 1914; Libby, O. G. 1899b. Young birds. *Gallus*. Thorndike, E. L. 1899.

Anas. Chodziesner, M. 1929. *Anous s. stolidus*. Watson, J. B. 1908, *1910. *Anserinae*. Mather, F. 1892. *Anthus*. Stubbs, F. J. 1913b. *Chaetura*. Abbott, W. M. 1923. *Columba*. (Homing and carrier pigeons.) Claparède, E. 1903; Cyon, E. 1900a, b; Exner, S. 1891, 1892; Glaesener, —. 1897; Hachet-Souplet, P. 1902, 1910, 1911; *Hodge, C. F. 1894; La Perre de Roo, V. 1876; Musy, M. 1911; Rabaud, E. 1926; Reynaud, G. 1897; Stubbs, F. J. 1913b; Thauziès, A. 1905a, b, 1910, 1912, 1913; Watson, J. B. 1915a; Winkler, T. C. 1886; Wurm, W. 1900b. Includes *Columba*. Casamajor, J. 1928. *Corvus*. Siedentopf, A. 1887. *Phylloscopus*. Dewar, J. M. 1921. *Sterna f. fuscata*. *Watson, J. B. 1910. *Sterna paradisica* & *Sterna s. sandvicensis*. Dirksen, R. 1932. *Troglodytes*. Baldwin, S. P. & Bowen, W. W. 1928.

Military use of homing or carrier pigeons. Fellmer, —. 1889; Lincoln, F. C. 1927a; Tegetmeier, W. B. 1892.

Position sense. *Passer*. Porter, J. P. 1904.

Remarkable flight. *Columba*. Winkler, T. C. 1886.

Terrestrial magnetism in relation to orientation. Thomson, A. L. 1923b.

Weather effects. Many species. Martorelli, G. 1892. *Columba*. Seilkopf, H. 1923.

EXPERIMENTAL STUDIES

General. Includes birds. Viguiet, C. 1882. *Anous s. stolidus*. *Watson, J. B. & Lashley, K. S. 1915. *Astur* & *Chelidon r. rustica*. Rüppell, W. 1937. *Columba*. (Carrier pigeon.) Schneider, G. H. 1905. *Hirundo rustica*. Wodzicki, K. & Wojtusiak, R. 1934. *Iynx* & *Lanius collurio*. Rüppell, W. 1937.

Sterna f. fuscata. *Watson, J. B. 1908; *Watson, J. B. & Lashley, K. S. 1915. *Sturnus vulgaris*. *Rüppell, W. 1935, 1937.

Ability to return to breeding place when sent by aeroplane to considerable distances. Many species. *Rüppell, W. 1937.

Castration experiment. No effect. *Columba*. van Oordt, G. J. & Bol, C. J. 1929.

Factors in orientation. Casamajor, J. 1927.

HYPOTHESIS OF VESTIBULAR FUNCTION

General. *Columba*. Cyon, E. de 1878, 1900b, 1908; Stefani, A. 1902–03.

Related to rotation of earth. *Anas* & *Columba*. Dubois, R. 1915.

OSSIFICATION

Including calcification.

Books. Text in German. Many species. Gadow, H. 1891d.

Text in Latin. *Gallus*. Scarpa, A. 1799.

General. Davy, J. 1867a; Knopff, W. 1917; *Studer, T. 1889. Many species. Hoffmann, C. K. 1879a; *Parker, W. K. 1864b, 1877, 1879b. Include birds. Brullé, A. & Hugué, —. 1845a, b; Goette, A. W. 1877; Jacquemin, E. 1836e. Many fully labeled figures. *Parker, W. K. 1890.

Accipitres. Sushkin, P. P. 1899b. *Anas*. Strong, R. M. 1920, 1921b, 1923b, 1925. Anatidae. *Parker, W. K. 1890. *Anser*. Staurengi, C. 1896; Strong, R. M. 1920, 1921b, 1923b, 1925. *Apteryx*. Parker, T. J. 1888, 1892a, b. *Columba*. *Haller, A. 1767b; Schöney, L. 1876. Includes *Columba*. Maas, H. 1877. *Cypselus melba*. Zehntner, L. 1890a. *Eudyples*. Männich, H. 1903. *Gallus*. Bruch, C. W. 1852; *Haller, A. 1767b; Leboucq, H. 1880; *Lubosch, W. 1923; *Parker, W. K. 1888–94, 1889b; Schöney, L. 1876; Strong, R. M. 1920, 1921b, 1923b, 1925. Includes *Gallus*. Maas, H. 1877. *Opisthocomus cristatus*. *Parker, W. K. 1891. *Phalacrocorax atriceps georgianus*. Shufeldt, R. W. 1914a. *Pygoscelis*. Anthony, R. L. 1913a. Striges. Müller, W.

1907. *Struthio*. Hildebrandt, G. F.
1805. *Vanellus*. Grosser, O. & Tandler,
J. 1909.

Availability of minerals. *Gallus*.
Bethke, R. M., Kennard, D. C., &
Kik, M. C. 1929.

Endochondral ossification. Includes
Gallus. Lubosch, W. 1923.

Sex difference. *Gallus*. Schroeder,
C. H. 1933.

Syrinx ossification. Passeres. *Set-
terwall, C. G. 1901.

Tendon ossification. Lieberkühn,
N. 1860. *Columba*. Retterer, E. &
Lelièvre, A. 1911b. *Picus*. Lieber-
kühn, N. 1863.

Trachea ossification. Cuculidae.
Shufeldt, R. W. 1901f.

Long bones and bones of hand and foot

General. *Gallus*. Brachet, A. 1893.

Carpal and tarsal bones. Morse,
E. S. 1874.

Clavicle. *Serinus* & *Gallus*. Kulczy-
cki, W. 1908.

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Middle America. Kellogg, V. L. 1899b.

North America. List of species. Kellogg, V. L. 1899a, b.

Alcinae. Waterston, J. 1914. *Columba*. Henry, — & Leblois, —. 1923. *Gallus*. Herrick, G. W. 1915; Müller, T. 1907. *Nestor notabilis*. Kellogg, V. L. 1907. *Opisthocornus*. Kellogg, V. L. 1910.

ENDOPARASITES (INTERNAL PARASITES)

General. Leidy, J. 1882.

Australia. Lists. Johnston, T. H. 1910, 1912.

East Africa. Loveridge, A. 1923.

Organisms in excrement. *Anser*. Maddox, R. L. 1882. *Gallus*. Gage, G. E. 1911.

Bacteria

Bacteria of intestine. Scheunert, A. & Schiebllich, M. 1922.

Intestinal spirochetes. Lebailly, C. 1913. *Spirochaeta gallinarum*. Hindle, E. 1911.

Fungi

General. In *Anas*. Leidy, J. 1875b. In *Phoenicopterus*. Leidy, J. 1875a.

ASPERGILLUS

General. In *Struthio*. Walker, J. 1913a.

Air sacs. *Columba*. Generali, G. 1879b.

Dermatomycosis. *Gallus*. Matruchot, L. & Dassonville, C. 1899.

FUNGI PARASITIC IN VARIOUS ORGANS

Lungs. Müller, J. J. 1842b. *Anas* [Somateria] *mollissima*. Eudes-Deslongchamps, J. A. 1841a, b, c.

Thorax. Murie, J. 1872c.

Protozoa

In intestine and liver. Poultry. Hadley, P. B. 1916c.

In *Lagopus*. Fantham, H. B. 1911d.

VARIOUS PARASITIC PROTOZOA

Amoebae in cecum. *Meleagris*. Nölker, W. 1927.

Flagellates in intestine. Cunha, A. & Muniz, J. 1925.

Giardia. Hegner, R. W. 1925.

Hematozoa (Blood parasites)

General. Böing, W. 1925; Cardamatis, J. P. 1909b; Carini, A. 1912; Carini, A. & Maciel, J. 1916; Danilevsky, V. 1886, 1890; Franchini, G. 1923; Laveran, C. L. 1890, 1891, 1892, 1898, 1899a, b, 1901; Léger, A. & Blanchard, R. A. 1911; Léger, A. & Husnot, P. 1912; Léger, M. 1913; MacCallum, W. G. 1897a, b, 1898; Marulaz, M. 1912; Opie, E. L. 1897; Plimmer, H. G. 1912, 1913; Sergeant, E. & Sergeant, E. 1904; Simond, P. L., Aubert, —, & Noc, —. 1909; Wülker, G. 1925b. Many species. Sergeant, E. & Sergeant, E. 1905a, b, 1907. Include birds. Labbe, A. 1894; Neave, S. A. 1906.

Avian host species. List with names of recorders and dates of records. Wenyon, C. M. 1926.

Halteridium parasitic in birds. Cardamatis, J. P. 1912. In *Turdus*. Coles, A. C. 1906.

Hematozoa parasitic in birds of various regions. Australia. Cleland, J. B. & Johnston, T. H. 1909. Italy. Franchini, G. 1924. Japan. Mine, N. 1914.

Hematozoa in skin. Danilevsky, V. 1886.

Hematozoa in various birds. *Lagopus*. Fantham, H. B. 1910d. *Meleagris* & *Perdix*. Laveran, C. L. & Lucet, A. 1905. *Melopelia*. Laveran, C. L. & Pettit, A. 1909.

Hemogregarinidae. Aragão, H. B. 1911. *Hemogregarina*. Darling, S. T. 1912.

Hemoproteus. Darling, S. T. 1912; Prowazek, S. J. 1920a. Book. Text in German. Prowazek, S. J. 1920b. Sergeant, E. & Béguet, M. 1914. Development of *Hemoproteus* in intestine. Mezincescu, D. 1909a.

Hemosporidia. Galli-Valerio, B. 1902.

Leukocytozoa

General. Aubert, P. & Heckenroth, F. 1911; Franca, C. 1912b; Moldovan, J. 1913; Walker, J. 1913b.

Leukocytozoa parasitic in birds of Portugal. Franca, C. 1912a.

In *Anser*. Knuth, P. & Magdeburg, F. 1924. In *Falco nisus*. Mezincescu, D. 1909b. In *Gallus*. Mathis, C. & Léger, M. 1909a, c, 1910d. In *Haliaeetus*. Laveran, C. L. & Nattan-Larrier, L. 1911. In *Ixus hainanas*. Mathis, C. & Léger, M. 1910c. In *Lagopus*. Fantham, H. B. 1910e. In *Querquedula* & *Turtur*. Mathis, C. & Léger, M. 1910b.

Periodicity of sexual stages in blood. *Gallus*. Mathis, C. & Léger, M. 1909c.

Trypanosoma

General. Brimont, E. 1912; Cardamatis, J. P. 1909b; Helm, R. 1914; Nieschultz, O. 1921; Vassal, J. J. 1905; Wenyon, C. M. 1908.

Africa. Zupitza, M. 1909.

Paraguay. Migone, L. E. 1916.

Parasitic on *Falco nisus*. Mezincescu, D. 1909b. *Gallus*. Mathis, C. & Léger, M. 1909d. *Turdus*. Coles, A. C. 1906.

Susceptibility to trypanosome infections. Mesnil, F. & Martin, G. 1906.

Trypanosoma gallinarum. In *Gallus*. Duke, H. L. 1912.

Trypanosoma gambiense. Duke, H. L. 1912. Parasitic on *Gallus*. Mesnil, F. & Blanchard, R. A. 1912.

Trypanosoma rhodesiense. Parasitic on *Gallus*. Mesnil, F. & Blanchard, R. A. 1912.

Infusoria

General. Parasitic on *Columba*. Willach, P. 1893.

Herpetomonas in blood of birds. Fantam, H. B. & Porter, A. 1916.

Trichomonas parasitic on *Gallus*. Andrews, J. M. 1926; Hadley, P. B. 1916a. Strigiformes. Andrews, J. M. 1926.

Sporozoa

Coccidium. Labbe, A. 1893. *Coccidium cuniculi*. Hadley, P. B. 1909b.

Development of *Coccidium* in intestinal epithelium. Includes *Gallus*. Railliet, L. J. & Lucet, A. 1891b.

Eimeria avium. Johnson, W. T. 1924. Morphology and life history. Fantam, H. B. 1910b.

Eimeria pfeifferi parasitic in *Columba*. Nieschultz, O. 1922a, b, 1925.

Giardia in birds. Hegner, R. W. 1925.

Pathogenic Gregarinida. Pfeiffer, L. 1888-89.

Sarcosporidia (Muscle parasites). Stiles, C. W. 1893.

Worm parasites

General. Jones, H. V. 1914.

In eye. Includes birds. Nordmann, A. 1843. Includes *Falco* & *Larus*. Rayer, P. F. 1843b.

Intestinal worm in heart of *Ciconia nigra*. Schwaitzer, F. 1864.

CESTODA (TAPE WORMS)

Epidemic among Washington sea birds. Bowles, J. H. 1908b.

In poultry. Hassall, A. 1896a. *Gallus*. Stiles, C. W. 1896.

NEMATODA (ROUND WORMS)

General. Stiles, C. W. 1892. Parasitic on *Gallus*. Winder, F. A. 1902.

In nictitating membrane of eye. Sanders, D. A. 1929.

Ascaridia perspicillum. Effects on thymus gland. *Gallus*. Ackert, J. E. 1924.

Strongylus. Cobbold, T. S. 1882.

Syngamus trachealis. See also under **Pathology**: Gapes. Mégnin, J. P. 1880c; Walsingham, T. G. 1887.

Trichosoma parasitic on *Meleagris*. Barile, C. 1912b.

Trichosoma contortum. In liver. Railliet, L. J. & Lucet, A. 1889.

Ascaris

Causing lesions of skin. *Gallus*. Railliet, L. J. & Lucet, A. 1891a.

In egg shell. *Gallus*. Pavesi, P. 1893a.

Fillaria

General. Bancroft, T. L. 1890; Itenko, W. 1913.

In blood of birds. Cullen, E. K. 1903; Danilevsky, V. 1886, 1890.

Microfilaria parasitic in *Gallus*. Mathis, C. & Léger, M. 1909b.

In poultry. Garman, H. 1897. In *Turdus*. Coles, A. C. 1906.

TREMATODA (FLUKES)

General. Jägerskiöld, L. A. 1908.

Collyriclum faba. In poultry. Riley, W. A. 1931.

Trematode infesting chicks and found in another stage in dragonfly nymphs. Lakela, O. 1932.

PARASITES IN VARIOUS STRUCTURES

Brain. *Corvus cryptoleucus*. Smith, A. P. 1908b.

Cecum. *Gallus*. Martin, C. H. & Robertson, M. 1911.

Eye. *Gallus*. Mathis, C. & Léger, M. 1910a. *Meleagris*. Ozoux, M. 1910.

Skin parasites. Danilevsky, V. 1886.

Tissue arachnids. Mégnin, J. P. 1879a.

PARATHYROID GLANDS

General. Pettit, A. 1898. *Gallus*. Vermeulen, H. A. 1917. Includes *Columba*, *Gallus*, & *Sylvia* (pp. 106-108). Thompson, F. D. 1910.

Ablation of parathyroid glands. *Gallus*. Doyon, M. & Jouty, A. 1904.

Collagenous fibers. *Columba*. Livini, F. 1909b.

Development. *Gallus*. *Mall, F. P. 1887. *Passer*. Helgsson, C. 1913. *Podilymbus*. Johnson, C. E. 1918a.

Effect of fluorine. *Gallus*. Hauck, H. M., Steenbock, H., Lowe, J. T., & Halpin, J. G. 1933.

Enlargement. *Gallus*. Doyle, L. P. 1925a.

Histology of parathyroid gland deprived of ultraviolet light. *Gallus*. Nonidez, J. F. & Goodale, H. D. 1927.

Structure. Many species. Forsyth, D. 1908.

PATHOLOGY

This section includes references dealing with disease in birds. For abnormalities in structure and development, see under **Teratology**. For association of birds with human diseases and disorders, see under **Diseases of man**. Because of vague diagnoses, especially in earlier publications, considerable difficulty was encountered in classifying some entries. See also under **Accidents, Aviculture, Mortality, Parasitology, and Poultry culture**.

Books. Text in English. Cooper, J. W. 1869; Pearl, R., Surface, F. M., & Curtis, M. R. 1915; Roberts, T. S. 1932; Ward, A. R. & Gallagher, B. A. 1920. Include birds. Gamgee, J. 1863-64; Moore, V. A. 1916. Includes captive birds. *Fox, H. 1923. Poultry. Kaupp, B. F. 1927b. Song birds of Great Britain. Nash, J. 1872. *Lagopus*. Lovat,—and others 1911; Wilson, E. A. and others 1911b. Includes *Psittacidae*. Lauder, T. D. & Brown, T. 1835. *Tympanuchus cupido americanus*. Gross, A. O. 1930. Parasitic diseases. Theobald, F. V. 1896.

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Text in German. Bröcker, H. 1904; Graffunder, O. 1907; Klee, R. 1905; Otte, W. 1928; Reinhardt, R. 1922. Includes birds. Hansemann, D. P. 1909. Cage birds. Achtermann, C. 1847; Braun, F. 1908a. Domesticated birds. Baldamus, A. C. 1903. Poultry. Zürn, F. A. 1882a.

General. Arenberg, P. 1910; Chaignon, V. 1910; Delafond, O. 1851a, c; Ercolani, G. B. 1860; Franken,—. 1878; Hertwig, C. H. 1849; Hoffmann, J. M. 1690; Hohnau, A. L. 1838; Laurent,—. 1905; Ledel, S. 1688; Müllern, J. 1873b; Ollmann,—. 1886; Ottolenghi, D. 1912a, b, 1913b; Paul,—. 1883; Pernot, E. F. 1900; Reimann,— & Beier,—. 1888; Rü diger, E. 1878b; Schmidt, M. 1878; Schütz,—. 1884; Sedgwick, T. F. 1901; Shufeldt, R. W. 1881b; Stölker, C. 1872; Zürn, F. A. 1883, 1885. Cage birds. Dankler, M. 1900-01; Rau, J. 1881. Game birds in France. Galli-Valerio, B. 1926. Northern birds. Faber, F. 1833. Poultry. Beach, J. R. 1920-21; Beach, J. R. & Freeborn, S. B. 1922; Gardiner, H. C. 1903; Hege, F. E. 1898; Kaupp, B. F. 1912, 1915; Newsom, I. E. 1930; Rolf, A. F. & Payne, L. F. 1914; Salmon, D. E. 1917; Thompson, W. C. & Dodson, L. S. 1922; Waite, R. H. 1921.

Bonasa. Gross, A. O. 1925a, 1928. *Columba*. *Djoubelieff, — & Roquet, —. 1910. *Columba palumbus* & *Falco*. Corbin, G. B. 1896. *Gallus*. Belfanti, S. & Ascoli, A. 1916; Belfanti, S. & Zenoni, C. 1899; Bradshaw, G. 1908; *Djoubelieff, — & Roquet, —. 1910; Edwards, P. R. & Hull, F. E. 1929a; Löde, A. 1901-02; Milks, H. J. 1908; Noll, F. C. 1889b; *Raymond,— & Chrétien, A. 1912; Richardson, H. D. 1852; Stafseth, H. J. & Mallman, W. L. 1928; Weber, C. E. 1886. In Africa. Zollenkopf,—. 1912. *Larus*. Smalley, F. W. 1909a. *Meleagris*. Bradshaw, G. & Wyndham, A. L. 1911; *Raymond,— & Chrétien, A. 1912. *Motacilla* & *Parus*. Lemetteil, E. 1868. *Phasianidae*. Olds, H. W. 1910b. *Phasianus*. Klein, E. E. 1893; Leclerc,—. 1890; Morse, G. B. 1910. *Rallus*. Lemetteil, E. 1868. *Rhamphastus carinatus*. Shufeldt, R. W. 1913e. *Serinus*. Böcker, W. 1878; Krause, K. 1878; Pfaff, F. 1905. *Sterna*. Smalley, F. W. 1909a. *Struthio*. Walker, J. 1916. *Sylvia hortensis*. Anzinger, F. 1893a.

EXPERIMENTAL PATHOLOGY

General. Féré, C. 1899h.

Diabetes mellitus. *Anas* & *Anser*. Kausch, W. 1896. *Anas* & *Falcones*. Weintraub, W. 1894.

Inoculation experiments. *Gallus*. Delafond, O. 1851b.

Morphine effects. *Anas* & *Gallus*. Féré, C. 1897d.

PATHOLOGY OF VARIOUS ORGANS AND STRUCTURES

Abdomen. Due to parasites. Larcher, O. E. 1875b.

Blood. See also under **Parasitology**. *Gallus*. Balfour, A. 1907. Includes *Gallus*. Book. Text in English. Burnett, S. H. 1917. *Lagopus*. Fantham, H. B. 1910c, 1911c.

Nervous system. Larcher, O. E. 1877a.

Peritoneum. Larcher, O. E. 1875b.

Suprarenal capsule. Canalis, P. 1886-87.

Thyroid gland. *Gallus*. Buchanan, G. 1926.

Vagus nerves. Pathologic effects of cutting. *Columba*. Knoll, P. 1880.

Alimentary canal

Fistula of crop. *Columba*. Stamati, G. 1888a.

Infectious purulent entero-proventriculitis. *Gallus*. Kaupp, B. F., Dearstyne, R. S., Wilfong, H. S., & Greene, L. M. 1928.

INTESTINE

Diarrhea. External temperature as factor. *Gallus*. Hall, G. E. 1932.

Dysentery. *Gallus*. Lucet, A. 1891; Yamazaki, M. 1897. *Meleagris*. Lucet, A. 1891.

Intussusception. *Gallus*. Hartmann, P. J. 1689d.

Intestinal diseases. Treatment

General. Kaupp, B. F. & Dearstyne, R. S. 1925.

Green feed as antiseptic. Philips, A. G., Carr, R. H., & Kennard, D. C. 1921.

Infectious enteritis. *Gallus*. Klein, E. E. 1889a. Book. Text in English. Klein, E. E. 1892b.

Ceca

General. *Gallus*. Bailer, R. 1911; Baker, A. D. 1931.

Abligated ceca. Utilization of food. *Meleagris*. Hunter, J. E., Durant, A. J., & Hogan, A. G. 1930.

Lesions resulting from ligaturing. Maumus, J. 1902c.

STOMACH

General. Baistrocchi, E. 1886.

Gizzard

Dilation due to relaxed muscular coat. *Gallus*. Nainsouta,—. 1923.

Hypertrophy. Hérissant, F. D. 1757b.

Obstruction. *Bucorax abyssinicus*. Mouquet, A. 1922b.

Circulatory organs

General. Larcher, O. E. 1874a.

Aneurysms of arteries. *Gallus*. Féré, C. 1894a.

Apoplexia. Raspail, X. 1909b. *Anas* & *Gallus*. Flourens, M. J. 1831.

Arteriosclerosis. Psittaci. Wolkoff, K. 1925.

HEART

General. Larcher, O. E. 1874a. Includes *Anas*, *Columba*, *Gallus*, & *Phasianus*. Rayer, P. F. 1848.

Endocarditis. Larcher, O. E. 1874a.

Envelopment in a false membrane. *Anas*. Rayer, P. F. 1864.

Myocarditis. After section of both vagus nerves. *Columba*. Knoll, P. 1880.

Ossification of pericardium. *Anas*. Ceresole, G. 1900.

Pericarditis. Larcher, O. E. 1877b; Trémeau de Rochebrune, A. 1852. *Anas*. Foot, A. W. 1868.

Eggs

Bacterial infection. *Gallus*. Brannon, M. A. 1893; Caldwell, D. W. 1915; Hadley, P. B. & Caldwell, D. W. 1916; Sachs-Muke,—. 1907.

Fungus growths in and upon eggs during incubation. *Casuaris*. Eudes-Deslongchamps, J. A. 1865. *Gallus*. Dareste, C. 1882d.

Pathologic products in egg. *Gallus*. Lominski, F. 1896.

Ruptured yolk. Etiology. *Gallus*. Hoffman, H. A. 1933.

Watery degeneration of ova in ovary. *Gallus*. Landois, H. 1894f.

ECTOPIA (EGGS IN ABDOMINAL CAVITY)

Atrophied eggs. Eudes-Deslongchamps, J. A. 1859. *Gallus*. Eckstein, K. 1889b; Ohler, K. W. 1899b; Rayer, P. F. 1864; Szuman, J. G. 1926a.

Embryo nearly ready for hatching in egg lodged in oviduct. *Gallus*. Baumbach,—. 1923.

Feathers

General. *Ramphastos carinatus*. Shufeldt, R. W. 1913a.

Loss of feathers. *Psittacus*. Heusinger, K. F. 1877a.

Head

Diagnosis. *Gallus*. Beach, J. R. 1921.

Encephalitis. *Gallus*. Dammann, C. & Manegold, O. 1907; Greve, L. 1908.

Epilepsy association. Hartmann, P. J. 1689b.

Hydrocephalus. *Gallus*. Hansemann, D. P. 1911.

VARIOUS PARTS OF HEAD

Caruncle, effects on form of. *Columba* varieties. Otto, Herman 1910.

Meninges, congestive and hemorrhagic changes. Larcher, O. E. 1877b.

Mouth, swelling of floor due to masses of grass. *Cygnus*. Pam, A. 1915.

Semicircular canals. *Columba*. Rosenthal, W. 1903b.

Wattles. *Gallus*. Edema due to organism of *Pasteurella* group. Seddon, H. R. 1914.

Eye

General. Gubler, A. 1863; Mouquet, A. 1894. Includes birds. Anon. 1864. *Columba*. Larcher, O. E. 1876. *Gallus*. Flourens, M. J. 1831; Larcher, O. E. 1876.

Atrophy. Relation to deformed beak. *Gallus*. Féré, C. 1895c.

Catarrh. *Phasianus*. Bertrand, D. M. 1913.

Coloboma of iris. Development. Lindahl, C. 1912.

Congestion of conjunctiva due to parasite. *Gallus*. Mathis, C. & Léger, M. 1910a.

Epidemic eye disease. *Tadorna*. Leibrecht, K. 1902.

Nematode worm parasitic in nictitating membrane of eye. Sanders, D. A. 1929.

Parasitic disorder. *Anser*. Larcher, O. E. 1876.

Cataract

General. Larcher, O. E. 1876. Includes *Ardea*. Crisp, E. 1871.

Congenital cataract. Macnab, A. 1889.

Kidneys and urinary passages

Birds in captivity. Larcher, O. E. 1874b.

Renal calculus. *Gallus*. Gahrlied, G. C. 1689.

Liver

General. *Anser*. Minkowski, O. 1886.

Cirrhosis. Histocytes. Includes birds. Peruzzi, M. 1911.

Enlargement of liver. *Gallus*. Eberhardt,—. 1863a.

Gall stones (Cholelithiasis). *Serinus*. Edington, J. W. 1927.

Hypertrophy. Gahrlied, G. C. 1694. *Gallus*. Bouillet, J. 1732. *Sphyrapicus*. Bolles, F. 1892b.

Stony nodules in liver. *Gallus*. Hoffmann, J. M. 1690.

Yellow liver. Aubry,—. 1918b.

FATTY DEGENERATION

General. *Gallus*. Hartmann, P. J. 1689a.

In captivity on diet with too much sugar. *Sphyrapicus*. Bolles, F. 1892b.

Locomotor organs

General. Larcher, O. E. 1875a.

Trophic lesions of extremities. *Numida*. Vergely, P. 1893.

LEGS

Bone deformities in young. *Gallus*.
Herner, M. C. & Robinson, A. D. 1932.

Gangrene. Mouquet, A. & Truche,
C. 1924.

Necrosis of foot. *Vanellus*. Nichols,
A. R. 1905.

Weakness

General. Cole, L. J. 1909c.

Experimental production. Hart, E.
B., Halpin, J. G., & Steenbock, H. 1920.
Gallus. Hart, E. B. and others 1922.

Nutritional leg weakness. *Gallus*.
Bethke, R. M., Kennard, D. C., &
Kik, M. C. 1925; Bethke, R. M.,
Record, P. R., & Kennard, D. C. 1931;
Miller, R., Dutcher, R. A., & Knandel,
H. C. 1929.

Perosis or deforming leg weakness.
Gallus. Titus, H. W. 1932.

Reproductive organs

General. Includes birds. Sutton,
J. B. 1885a.

FEMALE SEX ORGANS

General. Larcher, O. E. 1873; K., T.
1880.

Ovary

General. *Gallus*. Maynard, C. J.
1896a.

Atrophy. *Gallus*. Davaine, C. J.
1865. *Lyrurus t. tetrrix*. Wiebke, P. M.
1885.

Degeneration. Experimental feed-
ing and environmental changes. *Gallus*.
*Stieve, H. 1918.

Hypertrophy. *Gallus*. Fougereux
de Bondaroy, A. D. 1774.

Infection. *Gallus*. Rettger, L. F.
1914.

Ovarian cysts. Larcher, O. E. 1875b.

Oviduct

Book. Text in German. Durski,
S. P. 1907.

General. Klee, R. 1904. *Gallus*.
Baudouin, M. 1913; Geoffroy St.
Hilaire, E. 1822f.

Cyst. *Gallus*. Reese, A. M. 1918.

Egg mass lodged in upper portion
of oviduct, accumulating other eggs.
Gallus. Hiden, R. B. 1921.

Inflammation. *Gallus*. Crisp, E.
1870; Geoffroy St. Hilaire, E. 1822f.

Ruptured oviduct. *Gallus*. Martin,
J. H. & Anderson, W. S. 1919.

Occluded oviduct

General. Baumbach,—. 1923.

Ovulation into body cavity. *Gallus*.
Curtis, M. R. & Pearl, R. 1915.

TESTIS

Hyperplasia. *Anas*. Mencl, E.
1907.

Hypertrophy. *Anas*. Foot, A. W.
1868.

Interstitial tissue of testis. Includes
birds. Barnabo, V. 1906.

Osseous strands and atrophy. *Gallus*.
Buchanan, G. 1926.

Sterility of male due to cystic testes.
Gallus. Gowen, J. W. 1926.

Respiratory system

Bronchitis. *Gallus*. Gibbs, C. S.
1933.

Catarrh of nasal chambers. *Phasi-
anus*. Bertrand, D. M. 1913.

Coryza. *Gallus*. Vallillo, G. 1914.

Infectious bronchitis. Carriers.
Komarov, A. & Beaudette, F. R. 1932.
Gallus. Kernohan, G. 1930.

Laryngotracheitis. *Gallus*. Bush-
nell, L. D. & Brandly, C. A. 1933;
Hinshaw, W. R., Jones, E. E., & Gray-
bill, H. W. 1931.

AIR SACS

Amputation. *Leptoptilus*. Mouquet,
A. 1925.

Dilation of air sacs of head and neck.
Landois, H. 1884b.

Edema. Mouquet, A. 1929.

Fungi developed during life on inner
surface of air sacs. *Anas* [*Somateria*]
mollissima. Eudes-Deslongchamps, J.
A. 1841a, b, c.

Gangrene. *Leptoptilus*. Mouquet,
A. 1925.

Infectious inflammation. *Anser*.
Bugge, G. 1908.

Mucor infection. Yarrell, W. 1842.

LUNGS

Fungus infection of lungs. *Gallus*. Schütz,—. 1884.

Mycosis. *Phoenicopterus*. Mohler, J. R. & Buckley, J. S. 1904.

Pulmonary hemorrhage in flight involving "towering." Kinahan, G. H. 1877.

Skeleton

Bone brittleness. *Alauda*. Fischer, J. 1875.

Hemorrhage produced in bones with low air pressures. Experimental. Aggazzotti, A. 1903.

Lack of mineral matter. *Turdus*. Barrows, W. B. 1885a.

Malformation of growing bones. *Gallus*. Henderson, E. W. 1933.

Osteo-arthritis. *Anas* & *Anser*. Freese, K. 1907a.

Scoliosis, sternosacral. *Tetrao*. Garbowski, T. 1895a, 1896.

FRACTURES

See also under **Accidents**.

General. Larcher, O. E. 1875a.

Healing. *Fregilus*. Girtanner, G. A. 1873.

Joints. Larcher, O. E. 1875a.

Treatment. Arnold, W. W. 1915.

SKULL

General. *Columba*. Otto, Herman 1910.

Exostosis. *Gallus*. Stobaeus, K. 1730.

Skin

General. Gluge, G. 1851.

Cysts. Mégnin, J. P. 1879b.

Nodules. *Conurus*. Blanchard, R. A. 1891.

Pityriasis. *Gallus*. Mégnin, J. P. 1881.

Vesicular dermatitis. Newsom, I. E. & Feldman, W. H. 1920.

Uropygeal gland

Horn-like excrescence. *Vanellus*. Ticehurst, C. B. 1910b.

Hypertrophy. *Gallus*. Crisp, E. 1862a.

VARIOUS PATHOLOGIC CONDITIONS

Accidental lesions in wild birds. See also under **Accidents**. Richard, A. 1911.

Albuminuria. *Gallus*. Wittich, W. 1856.

Alcoholism. *Gallus*. Pearl, R. 1917a.

Asthenia. *Gallus*. Dawson, C. F. 1899.

Ataxia, hereditary. *Columba*. *Hoshino, T. 1919; Riddle, O. 1918a.

Biochemical study. Book. Text in German. Meinert, F. 1909.

Bromism. *Gallus*. Féré, C. 1893a.

Cholesteremia. Parhon, C. J. & Parhon, M. 1923.

Comparison between birds and mammals for certain disease conditions. Bayon, H. P. 1928b.

Effect of disease on fecundity. *Gallus*. Goodale, H. D. 1919b.

Elephantiasis. *Picus*. Lemetteil, E. 1868.

Encephalitis. *Streptococcus* infection. *Gallus*. Dammann, C. & Mane-gold, O. 1907; Greve, L. 1908.

Etiology of chief diseases of *Gallus*. Catterina, G. 1903.

Excessive fat in viscera. *Turtur*. Hartmann, P. J. 1689g.

Favus. *Gallus*. Heim, F. L. 1894; Mégnin, J. P. 1881.

Fever production. Bruggemann, R. 1898.

Forced feeding. Effects on viscera in normal and castrated birds. *Gallus*. Yosikawa, M. & Tomisima, R. 1932.

Glycemia. *Columba*. Marañón, G. & Rosique, A. 1916. *Gallus*. Giaja, J. 1912a, b.

Hernia. Hartmann, P. J. 1689c.

Hydrophobia (Rabies). Experimental infection. Löte, J. 1904. *Anas*, *Anser*, *Columba*, *Gallus*, & *Serinus*. Marie, A. 1904.

Hypervitaminosis. *Gallus*. Hall, G. E. & King, E. J. 1931.

Infectious cachexia. Abdominal cavity. *Gallus*. Rosencrantz, T. 1909.

Leukosis. *Gallus*. Ellerman, V. 1923; Finch, W. C. 1909. Includes *Gallus*. Book. Text in English. M'Gowan, J. P. 1926.

Lipemia. *Anser*. Bleibtreu, M. 1907.

Locoism congenital in chicks. *Gallus*. Knowlton, F. L. 1929.

Myeloid metaplasia. Origin. *Gallus*. Dantschakoff, W. 1916b.

Myxedema infantilis. *Gallus*. *Laudauer, W. 1929b.

Neurolymphomatosis gallinarum. Pappenheimer, A. M., Dunn, L. C., & Cone, V. 1926.

Parasitic diseases. Gage, G. E. 1910. Book. Text in English. Theobald, F. V. 1896. Text in French. Neumann, L. G. 1909.

Pathologic anatomy. *Anas*, *Columba*, & *Gallus*. Gurlt, E. F. 1849.

Plumbism from administration of lead. *Columba*. Hanzlik, P. J. 1923.

Pneumonia. Crisp, E. 1877b.

Poultry autopsy statistics. Tittsler, R. P. 1927.

Pruritus. Due to Ascarid worms. *Gallus*. Railliet, L. J. & Lucet, A. 1891a.

Pseudoinfluenza. Frosch, P. & Bierbaum, K. 1909.

Purulent abdomen. *Gallus*. Kaupp, B. F. 1919a.

Quail disease. Morse, G. B. 1917.

Severe winter weather, effects. Bunyard, P. F. 1917a; Tileston, W. M. 1875.

Subcutaneous hyperplasia. Beak and feet. *Gallus* & *Perdix*. Landois, H. 1896b.

Swollen head. *Meleagris*. Graham-Smith, G. S. 1907.

Tetanus. Experimental production of immunity. *Gallus*. Courmont, J. & Doyon, M. 1893.

Thrush. *Columba*. Yoshimura, I. 1921.

Virus disease. *Gallus*. Le Soudier, — & Verge, J. 1924.

Zoological garden autopsies. Germany. Schmidt, M. 1862.

Anaphylaxis (Anaphylactic shock)

Crop muscle reaction. *Columba*. Hanzlik, P. J. & Stockton, A. B. 1927.

Experimental anaphylactic shock. *Columba*. Arloing, F. & Langeron, L. 1922.

Inoculation of muscle tissue from tuberculous fowl. Fortineau, L. 1905.

Skin transplantation. Schultz, W. 1915.

Thrombocyte and erythrocyte changes. De Eds, F. 1926.

Anemia

Book. Text in English. Includes *Gallus*. M'Gowan, J. P. 1926.

In embryo. *Gallus*. Dareste, C. 1871b.

Infection with *Spirochaeta gallinarum*. Red blood corpuscle counts. *Gallus*. Launoy, L. & Lévy-Bruhl, M. 1913c.

Anthrax

General. Darling, S. T. & Bates, L. B. 1912; Hugi, F. J. 1837. *Anas*. Kitt, T. 1884–85. *Columba*. Kitt, T. 1884–85; Spangaro, S. & Mioni, G. 1904. *Gallus*. Kitt, T. 1884–85; Longo, T. 1880. *Meleagris*. Longo, T. 1880.

Dissemination by carrion feeders. Morris, H. 1912. By *Corvus* and fox. Mollet, F. 1913.

Immunity to anthrax. *Columba*. Czaplowski, E. 1890.

Aspergillosis

General. In *Gallus*. Curson, H. H. 1921. In *Struthio*. Walker, J. 1913a.

In air sacs. *Columba*. Generali, G. 1879b.

Bacillary white diarrhea

Pullorum disease. *Salmonella pullorum* infection.

General. Asmundson, V. S. & Biely, J. 1928, 1930; Beach, J. R. 1917; Beach, J. R. & Michael, S. T. 1930; Beaudette, F. R. 1925a; Beaudette, F. R. & Black, J. J. 1926, 1927; Beaudette, F. R., Bushnell, L. D., & Payne, L. F. 1923;

Bleecker, W. L. & Schilling, S. J. 1930; Brunett, E. L. 1927, 1930; Bunyea, H. 1926; Bunyea, H. & Hall, W. J. 1930; Bushnell, L. D. & Hinshaw, W. R. 1926; Bushnell, L. D., Hinshaw, W. R., & Payne, L. F. 1926; Dalling, T. & Allen, H. R. 1924; Doyle, L. P. & Mathews, F. P. 1928; Edwards, P. R. & Hull, F. E. 1929a; Emmel, M. W. 1929, 1930; Gage, G. E. 1922; Gage, G. E. & Paige, B. H. 1915; Gwatkin, R. 1924, 1925, 1927; Hadley, P. B. 1909c; Hadley, P. B. and others 1917; Hooker, W. A. 1926; Jones, F. S. 1913a, b; Kaupp, B. F. & Dearstyne, R. S. 1927; Kaupp, B. F. & Wilfong, H. S. 1929; King, D. F., Payne, L. F., & Bushnell, L. D. 1930; Konno, T. 1926; Mallmann, W. L. 1925, 1929; Mallmann, W. L., Thorp, F., & Semmes, M. 1928; Morse, G. B. 1908; Newsom, I. E. 1924; Rettger, L. F. 1909, 1914; Rettger, L. F. & Harvey, S. C. 1908; Rettger, L. F., Kirkpatrick, W. F., & Jones, R. E. 1914, 1915; Rettger, L. F., Kirkpatrick, W. F., & Stoneburn, F. H. 1912; Rettger, L. F. & Stoneburn, F. H. 1909; Runnells, R. A. 1929; Stafseth, H. J. & Johnson, E. P. 1927; Tittsler, R. P. 1927, 1927-28, 1929-30, 1932; Waite, R. H. 1925.

Autopsies. Dearstyne, R. S., Kaupp, B. F., & Wilfong, H. S. 1929.

Eggs of infected birds possibly a menace to man. Three minutes' boiling does not kill organisms. Rettger, L. F., Slanetz, C. A., & McAlpine, J. G. 1926.

Histopathology of intestines. *Gallus*. Gage, G. E. & Martin, J. F. 1916.

Mortality. Hamilton, C. M. 1932.

Recovery. *Gallus*. Horton, G. D. 1916.

Resistance. *Gallus*. Roberts, E. & Card, L. E. 1925, 1926.

DIAGNOSIS

General. *Gallus*. Gage, G. E., Paige, B. H., & Hyland, H. W. 1914; Graham, R., Thorp, F., & Torrey, J. P. 1933.

Intradermal test. *Gallus*. Ward, A. R. & Gallagher, B. A. 1918.

Agglutination

Agglutinability of strains. Antigens. *Gallus*. Mallmann, W. L. 1929.

Macroscopic agglutination test. *Gallus*. Dearstyne, R. S., Kaupp, B. F., & Wilfong, H. S. 1928.

Variation in repeated tests. Beach, J. R. 1927; Edwards, P. R. & Hull, F. E. 1929b; Jones, F. S. 1913a, b.

ETIOLOGY

Comparative studies

Bacterium pullorum and *B. sanguinarium*. General. *Gallus*. Rettger, L. F. & Koser, S. A. 1917.

Fermenting properties. Goldberg, S. A. 1917.

Salmonella pullorum

Comparison with *S. gallinarum*. May, H. G. & Goodner, K. 1926.

Isolation from liver, heart, blood, and yolk of *Salmonella pullorum*. *Gallus*. Kernkamp, H. C. 1929.

Production of gas. Goodner, K. & May, H. G. 1927; Weldin, J. C. & Weaver, H. J. 1929.

Transmission (through) *Gallus*

Chick to chick. Weldin, J. C. & Weaver, H. J. 1930b.

Droplet infection. Tittsler, R. P. 1927-28.

Eggs to offspring. Rettger, L. F. 1914, 1916; Runnells, R. A. & Van Roekel, H. 1926; Weaver, H. J. & Weldin, J. C. 1931.

Incubators. Hinshaw, W. R., Scott, H. M., & Payne, L. F. 1928; Hinshaw, W. R., Upp, C. W., & Moore, J. M. 1926.

Oviduct. Rettger, L. F., Kirkpatrick, W. F., & Card, L. E. 1919.

Tests for carriers. Beaudette, F. R. 1929; Michael, S. T. & Beach, J. R. 1929.

TREATMENT

General. Horton, G. D. 1915.

Chemical treatment. Cruickshank, G. A. & May, H. G. 1928. *Gallus*. May, H. G. & Segelin, H. E. 1926.

Control and eradication. Hitchner, E. R. & Russell, F. L. 1926; Waite, R. H. 1925.

Bilharziasis

General. FitzSimons, F. W. 1922.

Bird pox, chicken pox, fowl pox

See Epithelioma contagiosum.

General. *Anas* & *Anser*. Rayer, P. F. 1849. *Columba*. Jolyet, F. 1881; Michaelis, L. 1903a, b; Mingazzini, P. 1894; Rayer, P. F. 1849; Rivolta, S. 1874. *Gallus*. Beach, B. A., Lothe, H., & Haplin, J. G. 1915; Bollinger, O. 1873; Brumley, O. V. & Snook, J. H. 1916; Cary, C. A. 1906; Haring, C. M. & Kofoid, C. A. 1912; Johnson, W. T. 1929, 1930; Rátz, I. 1910, 1911; Rayer, P. F. 1849; Rivolta, S. 1874; Sanfelice, F. 1897; Schuberg, A. 1913; Schuberg, A. & Schubotz, H. 1910. *Meleagris* & *Motacilla*. Rayer, P. F. 1849.

Histopathology. *Columba*. Polowinklin, P. 1901. *Gallus*. Apolant, H. 1903.

Immunity to. *Gallus*. Manteufel, P. 1909-10.

Relation to diphtheria. Sigwart, H. 1910.

ETIOLOGY

General. *Gallus*. Carnwath, T. 1907; Uhlenhuth, P. & Manteufel, P. 1909.

Development of infectious organisms in lymph. Jolyet, F. 1881.

Transmission by mosquitoes. Matheson, R., Brunett, E. L., & Brody, A. L. 1931.

TREATMENT

General. Pyle, N. J. 1926.

Control. Gildow, E. M., Schilling, G. S., Moore, P., & Lampman, C. E. 1929.

Vaccination. *Gallus*. Beach, J. R. 1930; Pyle, N. J. 1929.

VIRUS

General. Ludford, R. J. 1928.

Pigeon pox virus as cutaneous vaccine for fowl pox. Johnson, E. P. 1932.

Botulism

This disease has also been described as "alkali poisoning," "lead poisoning," and "western duck sickness."

General. Many species. Munro, J. A. 1927. Waterfowl. Wetmore, A. 1915b.

Anatidae. Clarke, F. C. 1913; Kalmbach, E. R. 1934; Palmer, C. C. &

Baker, H. R. 1923; Wetmore, A. 1918b, c.

Cholera (Hemorrhagic septicemia)

Books. Text in French. Includes birds. Galtier, V. 1880.

Text in German. Kitt, T. 1904, 1912; Klett, R. 1911; Ostertag, R. 1913; Preuss, O. 1909.

General. Bermbach,—. 1904; Casper, M. 1908-09; Kaupp, B. F. & Dearstyne, R. S. 1925; Laurent,—. 1905; Leclairche, E. 1894; Lepetit,—. 1892; Longo, T. 1880; Mosler, F. H. 1903; Nelson, J. 1900; Neumann, K. 1919; Pound, C. J. 1896; Raspail, X. 1915b, 1917; Rosenthal, W. 1903a, b, 1908; Salmon, D. E. 1880; Schiffmann, J. 1906; Schmidt, J. 1904; Schöbl, O. 1909; Schroeder, C. 1901; Sisoff, P. 1914; Stolnikoff, V. I. 1913; Szász, A. 1919; Toussaint, H. 1881; Trétrop, E. 1900; Ward, A. R. 1904a; Weil, E. 1905, 1907, 1908, 1912, 1913; Anon. 1890a.

Anas. Cornil, A. V. & Toupet,—. 1888; Grimm, E. & Pfeiler, W. 1919. Anatidae. Perroncito, E. 1894. *Anser*. Grimm, E. & Pfeiler, W. 1919; Ostertag, R. & Ackermann, P. 1906. *Columba*. Hertel, M. 1903-04; Müller, J. 1910; Perroncito, E. 1894; Schreiber, O. & Stickdorn, W. 1918. *Cygnus*. Fiorentini, A. 1896. *Gallus*. Barberio, A. 1906; Beach, J. R. 1922; Berliner, M. & Citron, S. 1920; Buhl,—. 1902; Grimm, E. & Pfeiler, W. 1919; Hadley, P. B. 1911a; Haring, C. M., Jaffa, M. E., & Beach, J. R. 1919-20; Hertel, M. 1903-04; Higgins, C. H. 1898, 1899; Kaupp, B. F. & Dearstyne, R. S. 1935; Kliem, W. 1912; Moore, V. A. 1895b; Müller, J. 1910; Ostertag, R. & Bugge, G. 1906-07; Ostertag, R. & Wolfhügel, K. 1902; Pasteur, L. 1880b, c, d; Perroncito, E. 1894; Porcher, C. & Panisset, L. 1909; Prowazek, S. J. 1908; Solovtsovoi, A. S. 1912; Stengel, J. 1881; Talmy, J. 1880; Tchistovitch, N. 1909; Trincas, L. 1908; Van Es, L. & Martin, H. M. 1920; Zeiss, H. 1914; Anon. 1890a. *Rhea* & *Struthio*. Phisalix, C. A. 1902.

Analogy with sleeping sickness. Talmy, J. 1880.

Effects on central nervous system. *Gallus*. Pfenninger, W. & Finik, Z. 1926.

Transmission to swine. Koske,—. 1905.

CHOLERA ORGANISMS IN EGGS

General. *Gallus*. Doenitz, F. C. 1895.

Hydrogen sulphate formed in egg by cholera organisms. Kempner, W. 1894.

ETIOLOGY

Bacillus of cholera. Dowdeswell, G. F. 1886.

Cholera-like diseases in poultry. Study of eleven pathogenic organisms. *Hadley, P. B. & Amison, E. E. 1911a.

Virus. Mrowka, F. 1912. *Gallus*. Doerr, R. & Pick, R. 1915. Book. Text in German. Russ, K. F. 1906.

EXPERIMENTAL STUDY

General. Hadley, P. B. 1911a, b, 1912, 1914a, b, 1916b; Katz, O. 1889; Sulima, A. 1909.

Identity with experimental septice-mia. *Gallus*. Toussaint, H. 1880.

Weakening virulence of bacillus. Halász, F. 1917.

Immunization

Book. Text in German. Casper, M. 1908-09.

General. Citron, J. & Pütz, R. 1907; Gallagher, B. A. 1917; Huntemuller, O. 1906; Weil, E. & Braun, H. 1909.

Against *Bacillus avisepticus*. Hadley, P. B. 1919b.

Bacterins in control. *Gallus*. Mack, W. B. & Records, E. 1916b.

Inoculations. Dirchenkoff, S. G. 1913.

Rabbit against avian cholera. Del-fino, J. C. 1905.

Serum test. *Columba*. Braun, A. 1906.

TREATMENT

General. *Gallus*. Hadley, P. B. 1910a, 1911a, b.

Carbolic acid. Hadley, P. B. 1911a.

Chinine (Quinine). *Gallus*. Hallen-berger, —. 1913.

Serum treatment. *Gallus*. Roma-gnoli, M. 1902; Willerding, —. 1902.

Coccidiosis (Black head, entero-hepatitis)

Book. Text in English. Includes birds. Becker, E. R. 1934. *Lagopus scoticus*. Leslie, A. S. & Shipley, A. E. 1912; Wilson, E. A. 1911b.

General. Beach, J. R. & Corl, J. C. 1925; Brinkmann, A. 1927; Fantham, H. B. 1911a, b, 1915; Johnson, W. T. 1924; Morse, G. B. 1908; Sherwood, R. M. 1925; Young, B. P. 1929. Poultry. Johnson, W. T. 1923. Waterfowl. Coale, H. K. 1911.

Columba. Nieschultz, O. 1922a, b, 1925. *Gallus*. Beaudette, F. R. 1925b; Charles, T. B. 1922; Durant, A. J. 1930b; Eriksen, S. 1923; Hadley, P. B. 1909c; Johnson, W. T. 1928; Young, B. P. 1929. *Lagopus*. Fantham, H. B. 1910b; Fantham, H. B. & Smith, H. H. 1911. *Meleagris*. Cole, L. J. 1909c; *Cole, L. J., Hadley, P. B., & Kirkpatrick, W. F. 1910; Hadley, P. B. 1916b; Hadley, P. B. & Amison, E. E. 1911b; Higgins, C. H. 1917; Pernot, E. F. 1907; Rettger, L. F. & Kirkpatrick, W. F. 1927; Rettger, L. F., Kirkpatrick, W. F., & McAlpine, J. G. 1929; Tyzzer, E. E. 1923.

Development in intestinal epithe-lium. Includes *Gallus*. Railliet, L. J. & Lucet, A. 1891b.

Effects on weight. *Gallus*. May-hew, R. L. 1932a, b.

Experimental studies. *Columba*, *Gallus*, & *Lagopus*. Fantham, H. B. 1910a. *Meleagris*. Curtice, C. 1907a, b.

Immunity to avian coccidiosis. Johnson, W. T. 1927.

Mortality in artificially inoculated chickens. *Gallus*. Mayhew, R. L. 1933.

Paralysis effects. Mayhew, R. L. 1932c.

ETIOLOGY

Other species of coccidia responsible for coccidiosis

General. Hadley, P. B. 1916a.

Eimeria avium in *Lagopus*. Fantham, H. B. 1910e. In poultry. Johnson, W. T. 1924.

Eimeria pfeifferi. Nieschultz, O. 1925.

Experimental *Eimeria avium* infection. *Gallus*. Beach, J. R. & Davis, D. E. 1926.

Transmission

Common house fly as carrier. Dela-plane, J. P. & Stuart, H. O. 1933.

Distribution of oocysts on poultry farm. Andrews, J. M. & Tsuchiya, H. 1931.

Relation of *Passer* to poultry. Boughton, D. C. 1929.

Survival of coccidia in soil on surface of eggs. Warner, D. E. 1933.

TREATMENT

General. Andrews, J. M. 1933. *Meleagris*. Tyzzer, E. E. 1923.

Rearing and management of infected birds. *Meleagris*. Curtice, C. 1907b.

Surgical treatment. *Meleagris*. Durant, A. J. 1930a.

Value of various feeds. Sherwood, R. M. 1925.

Dermatomycosis

General. *Gallus*. Matruchot, L. & Dassonville, C. 1899.

Diphtheria (Canker, Diphtheric roup)

General. Arloing, F. 1912-14, 1913; Bertarelli, E. 1915; Bordet, J. 1907, 1909; Brumley, O. V. & Snook, J. H. 1916; Cagny, P. 1900; Cozzolino, V. 1881; Davalos, J. N. 1903-04; Domous-seau, E. 1912; Donnat, —. 1919; Eber, W. 1898; Eloire, C. 1907; Emmerich, R. 1884; Fally, V. 1908; Galli-Valerio, B. 1904; Harrison, F. C. 1903; Haus-halter, P. 1891; Hausser, A. 1909; Heller, —. 1880; Jorgenson, G. E. 1922; Kelsch, L. F. 1903; Kempa, A. 1909; Krayevski, A. 1888; Léniez, A. 1885; Loir, A. & Duclous, E. 1894; Nicati, W. 1879; Oyuela, A. M. 1917; Panisset, L. & Verge, J. 1923, 1924; Perrin, M. & Thiry, G. 1913; Pfeiffer, L. 1888-89; Schmidt, J. 1904; Schrevers, —. 1894; Seifert, O. 1884; Spiegelberg, R. 1915; Staub, A. & Truche, C. 1922; Streit, H. 1904; Sturm, —. 1914; Thiry, G. 1914; Trofimov, S. 1895; Vorontsoff, V. 1889; Anon. 1892. Include birds. Catrin, —. 1890; Ferré, G. 1897, 1899.

Columba. Babes, V. & Puscariu, E. 1890; Bordet, J. 1912; Brumley, O. V.

& Snook, J. H. 1916; Emmerich, R. 1884; Gratin, — & Liénaux, —. 1898; Loeffler, F. 1884; Mégnin, J. P. 1891b; Penzoldt, F. 1887; Quaranta, A. 1897; Ritter, J. 1895; Trincas, L. 1906. *Columba palumbus*. Ticehurst, C. B. 1907, 1908b; Witherby, H. F. 1908c. Gallinae. Cornil, A. V. & Mégnin, J. P. 1884, 1885. *Gallus*. Boggero, A. 1910; Bordet, J. 1908; Bordet, J. & Fally, V. 1910; Carnwath, T. 1907; Davison, J. T. 1890; Gratin, — & Liénaux, —. 1898; Henrijean, F. 1888-89; Klammer, —. 1890; Moore, V. A. 1895a; Przhemitski, N. 1897; Quaranta, A. 1897; Rátz, I. 1910, 1911; Ritter, J. 1895; Rivolta, S. 1884; *Sirena, S. 1885. Includes *Gallus*. Walley, T. 1887. *Perdix*. Eberlein, R. 1894b. *Zenaidura*. Taber, W. B. 1926.

Experimental study. Renshaw, C. J. 1885.

Hereditary resistance. Frateur, L. 1924.

Toxin. *Gallus*. Ferré, G. 1898.

Treatment. Nauta, J. 1906; Pyle, N. J. 1926. *Columba*. Piana, G. P. 1898. *Gallus*. Stolnikoff, V. I. 1916.

DIPHTHERIA OF

Intestine. *Nycticorax*. Poll, H. 1908a.

Oviduct. Petit, G. 1903.

ETIOLOGY

General. Müller, R. 1906. *Columba*. Piana, G. P. 1898.

Bacillus involved. *Columba*. Dean, G. & Marshall, W. E. 1908-09; Fally, V. 1911.

Etiological relations with

Chicken pox. *Gallus*. Uhlenhuth, P. & Manteufel, P. 1909.

Epithelioma contagiosum. *Gallus*. Uhlenhuth, P. & Manteufel, P. 1909-10.

RESEMBLANCE TO

Epithelioma contagiosum. Schmid, G. 1909.

Human diphtheria. Galli-Valerio, B. 1897; Menard, S. Y. 1890; Piorkowski, M. 1907, 1917; Rappin, G. 1912; Rappin, G. & Vanney, A. 1911.

Variola. Betegh, L. V. 1912a, b; Sigwart, H. 1910.

TRANSMISSIBILITY TO

Man. Cozzolino, V. 1881, 1888; Delthil, P. L. 1888.

Other animals. Experimental. Trasbot, L. 1879.

Edema

Air sacs. Mouquet, A. 1929.

Wattles. *Gallus*. Seddon, H. R. 1914.

Emphysema

General. *Gallus*. Hérissant, F. D. 1757b.

Subcutaneous emphysema. *Gallus*. Domm, L. V. 1931d.

Surgical emphysema. *Gallus*. Crew, F. A. 1926c.

Encephalitis

General. *Gallus*. Dammann, C. & Manegold, O. 1907; Greve, L. 1908.

Endocarditis

General. Larcher, O. E. 1874a.

Enteritis

General. *Gallus*. Pound, C. J. 1898.

Due to parasitic wounds. *Columba*. Hautefeuille, E. L. 1908-09.

Epidemics

Publications dealing with widespread diseases, including so-called epizootic disease.

General. Ableitner, —. 1878; Brusaferrero, S. 1901; Bugge, G. 1906; Delafond, O. 1850-51; Gallois, —. 1862b; Lanari, L. 1914; Matthey-Jeantet, —. 1918.

Anser. Loeffler, F. 1910. *Bonasa*. Stafseth, H. J. & Kotlan, A. 1925. *Columba*. Generali, G. 1879a. *Gallus*. Cagnetto, G. 1903; Calamida, D. 1903; Carrère, —. 1832; Cesaris-Demel, A. & Foà, P. 1899; Greve, L. 1901; Krauss, A. 1901; Löde, A. 1902a; Löde, A. & Gruber, J. 1901; Mazza, C. 1899. *Lophortyx*. Bussièrre de Nercy, —. 1866. *Parus*. Gehrke, —. 1903. *Phasianidae*. Ensor, C. A. & Eastes, G. L. 1906.

Distribution by *Corvus*. Klee, R. 1903.

Due to *Bacillus gallinarum*. *Gallus*. Klein, E. E. 1889d. To *Dispharagus*. Bridré, J. 1910.

Epidemic disease with septicemic characteristics. *Serinus*. Freese, K. 1907b.

Epilepsy

General. Hartmann, P. J. 1689b. Cage birds. Dankler, M. 1900-01. *Gallus*. Féré, C. 1893a.

Effects on brain. *Allende-Navarro, F. 1923.

Hemiplegic epilepsy. *Serinus*. Féré, C. 1894d.

Epithelioma contagiosum (Molluscum contagiosum)

Avian diphtheria, bird pox, cancer, epithelioma contagiosum, and sore head are variably regarded as identical or related. Believed by some authorities to be caused by bird pox virus.

Book. Text in German. Lipschütz, B. 1912.

General. Bollinger, O. 1873; Borrel, A. 1904; Brumley, O. V. & Snook, J. H. 1916; Burnet, E. 1906; Csokor, J. 1883a, b, 1884b; Fally, V. 1908; Loewenthal, W. 1906; Marx, E. & Sticker, A. 1902; Pyle, N. J. 1928; Verstraeten, C. & Vanderlinden, O. 1894. Poultry. Cary, C. A. 1906; Haring, C. M., Jaffa, M. E., & Beach, J. R. 1919-20. *Columba*. Juliusberg, M. 1904; Mingazzini, P. 1894. *Gallus*. Beach, J. R. 1920; Fox, T. C. 1898; Fumagalli, A. 1908; Juliusberg, M. 1904; Kinsley, A. T. 1907; Levaditi, A. & Nicolau, S. 1922; Mayer, L. 1909; Sweet, C. D. 1913.

Epithelioma and molluscum contagiosum compared. *Columba* & *Gallus*. Book. Text in Italian. Mazzanti, E. 1899.

Histopathology. Csokor, J. 1884b.

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1889b, c, 1890, 1891, 1892a; MacIntyre, D. 1918a; MacLagan, A. D. 1874; Shipley, A. E. 1913; Stubbs, F. J. 1909c.

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General. *Gallus*. Goebel, O. 1906.

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Vitamin A deficiency. *Gallus*. Beach, J. R. 1924.

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BERIBERI (MULTIPLE NEURITIS AND POLYNEURITIS)

Book. Text in English. Includes *Columba* & *Gallus*. Funk, C. 1922.

General. Eijkman, C. 1897, 1911; Fleisch, A. 1922; Fraser, H. & Stanton, A. T. 1910; Funk, C. 1912, 1914b; Matsushita, T. 1908; Maurer, G. 1909; Norris, L. C., Heuser, G. F., Wilgus, H. S., & Ringrose, A. T. 1930-31; Ogata, T., Kawakita, S., Oka, H., & Kagoshima, S. 1921; Ogata, T., Kawakita, S., Suzuki, S., & Kagoshima, S. 1921; Schaumann, H. 1911; Shibata,

Y. 1923; Ukai, S. & Kimura, O. 1921; Vedder, E. B. & Clark, E. 1912. Many species. Millet-Horsin,—, 1920. Includes birds. Shinza, R. 1923. Poultry. *Anderson, R. J. & Kulp, W. L. 1922.

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Effect of extract of thyroid gland. *Columba*. Seaman, E. C. 1920.

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Sunflower seed. Mattei, P. 1927.

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Curative effect of

Autolyzed yeast. Cooper, E. A. 1914.

Corn germs. *Gallus*. Carrick, C. W. & Carr, R. H. 1925.

PELLAGRA

General. *Gallus*. Norris, L. C. & Ringrose, A. T. 1930; Ringrose, A. T., Norris, L. C., & Heuser, G. F. 1931.

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General. Bethke, R. M., Kennard, D. C., & Kik, M. C. 1925; Johnson, W. T. 1924-25; Larcher, O. E. 1875a; Mussehl, F. E., Hill, R. S., & Ackerson, C. W. 1928; Pappenheimer, A. M. & Dunn, L. C. 1925; Tully, W. C., Hauge, S. M., Carrick, C. W., & Roberts, R. E. 1931a, b.

Buteo. Bishop, L. B. 1901b. *Columba* & *Dromaeus* [*Dromiceius*]. Sutton, J. B. 1889. *Gallus*. Hall, G. E. & King, E. J. 1931; Heuser, G. F. & Norris, L. C. 1926; Hughes, J. S. 1924; Hughes, J. S. & Titus, R. W. 1926; Mayerson, H. S. & Laurens, H. 1932; Sutton, J. B. 1889. *Meleagris*. Scott, H. M., Hughes, J. S., & Loy, H. W. 1932. *Rhea* & *Struthio*. Sutton, J. B. 1889.

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Enlargement of parathyroid glands. *Gallus*. Doyle, L. P. 1925a.

Experimental production. Hart, E. B. and others 1924.

In maturity. *Gallus*. Doyle, L. P. 1925a, b.

Short neck caused. *Cariama*. Günther, A. C. 1872.

Skeleton figured. *Gallus*. Sutton, J. B. 1889.

Prevention and treatment

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Irradiation from ultraviolet light

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In lymph nodes. *Psittacus*. Förster, A. 1862.

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General. *Gallus* & *Meleagris*. Volkmar, F. 1929.

Acute infectious omphalitis. *Gallus*. Brandly, C. A. 1932.

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Fowl paralysis. Diagnosis. Jungheer, E. 1933.

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See also under Bacillary white diarrhea.

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Isolation of organisms. Mallmann, W. L., Thorp, F., & Semmes, M. 1928.

Paratyphoid bacteria in poultry. *Hadley, P. B., Elkins, M. W., & Caldwell, D. W. 1918.

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Anas. Cominotti, L. 1916. *Anser*. Kleine, F. K. & Möllers, B. 1905. *Gallus*. Andriewsky, P. 1914; Cominotti, L. 1916; Crisp, E. 1874; Freese, K. 1908; Giemsa, G. & Prowazek, S. J. 1908; Hertel, M. 1903-04; Jess, P. 1901; Joest, E. 1902; Kleine, F. K. 1905; Künnemann, O. 1902; Landsteiner, K. & Berliner, M. 1912; Marchou, E. 1910; Mazzuoli, S. 1916. *Serinus*. Zeiss, H. 1914.

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Immunization against chicken plague. Erdmann, R. 1920.

Virus

General. *Columba*. Centanni, E. & Savonuzzi, E. 1900-01; Prampolini, B. & Centanni, E. 1900-01. *Gallus*. Centanni, E. & Savonuzzi, E. 1900-01; Landsteiner, K. 1906.

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General. *Bonasa*. Somers, J. 1883.

Calcium carbolate. Csokor, J. 1884c.

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Sudden death from eating bitter almonds. *Serinus*. Dürr, G. T. 1694.

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Diagnosis. Blanquinque, A. 1897.

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Prophylaxis. Alabern, E. 1899.

Ringworm disease

General. Mégnin, J. P. 1886.

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General. Brumley, O. V. & Snook, J. H. 1916; Elder, C., Kohn, F. J., &

Lee, A. M. 1930; Haring, C. M. & Kofoed, C. A. 1912; Kaupp, B. F. 1928; Marshall, H. 1900; Philips, A. G. 1915b; Sharp, J. G. 1900. Poultry. Jackley, J. G. 1917; Johnson, E. P. 1927.

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Control and effect upon egg production. Kaupp, B. F. 1928.

Etiology. *Gallus*. Weaver, C. H. & Mitchell, C. A. 1923.

Experimental study. Harrison, F. C. & Street, H. 1903.

Treatment. Pyle, N. J. 1926; Ward, A. R. 1904b.

Scabies (Foot disease, rough leg, scab, scaly leg)

General. Barbour, E. H. 1901; Haiduk, T. 1909; Masson, N. 1886; Müllern, J. 1873a; Reynal, J. & Lanquetin, —. 1863; Zürn, F. A. 1881. *Gallus*. Höflich, C. 1903; Schütz, —. 1884. *Spizella passerina*. Musselman, T. E. 1928. *Zenaidura*. Taber, W. B. 1926.

Septicemia

General. Anas. Sakharov, N. A. 1891. *Gallus*. Chatterjee, G. C. 1910; Lignières, J. 1894; Lisi, G. 1895; Rettger, L. F. 1900; Santori, S. 1896; Stockman, S. 1895-99.

Apoptectiform septicemia. Norgaard, V. A. 1902. *Gallus*. Magnusson, H. 1910. *Meleagris*. Volkmar, F. 1932.

Treatment. Papp, O. 1878

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General. *Gallus*. Zeiss, H. 1914.

In transportation of fowls. *Clausen, L. 1907.

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Books. Text in English. Includes birds. Nocard, E. I. 1910.

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J., Gilbert, A., & Roger, H. 1892; Carl, W. 1912; Forbes, J. G. 1900; Giltner, W. 1912; Hastings, E. G., Halpin, J. G., & Beach, B. A. 1913; Héricourt, J. & Richet, C. 1894; Himmelberger, L. R. 1914; Koch, M. & Rabinowitsch, L. 1907; Léniez, A. 1885; Leray, A. 1895; Mack, W. B. 1908; Maksutov, A. 1894; Marelli, C. A. 1914; Marelli, C. A. & Ubach, F. A. 1923-24; Mills, T. W. 1889; Moore, V. A. 1904; Moore, V. A. & Ward, A. R. 1903; Mouquet, A. 1921; Nocard, E. I. 1896, 1897; Ohler, K. W. 1899a; Pansini, S. 1894, 1898a, b; Parsons, A. R. 1891-92; Petit, G. 1902; Rayer, P. F. 1864; Rizzo, L. 1897; Salmon, D. E. 1896; Shattock, S. G. & Dudgeon, L. S. 1909; Sibley, W. K. 1890a, b; Straus, I. & Wurtz, R. T. 1889; Sutton, J. B. 1886; Sutton, J. B. & Gibbes, H. 1884; Van Es, L. & Schalk, A. F. 1914; Ward, A. R. 1902-03; Weber, A. & Bofinger, H. 1904; Werkman, C. H. & Gibbs, W. M. 1921. Include birds. Fox, H. 1924; Rayer, P. F. 1843a; Schreitmüller, W. 1926; Sibley, W. K. 1889, 1891a, b. Poultry. Dimock, W. W. & Willey, L. E. 1919; Hastings, E. G., Halpin, J. G., & Beach, B. A. 1913; Mack, W. B. 1908.

Anas. Flourens, M. J. 1831. *Columba*. Ogata, T. 1896-97; Wolfhügel, K. 1904. *Corvus* & *Cygnus*. Wolfhügel, K. 1904. *Falconiformes*. Bodinus, —. 1863. *Gallinae*. Cornil, A. V. & Mégnin, J. P. 1884, 1885. *Gallus*. Brusaferrro, S. 1890; Burckhardt, J. L. 1910; Burnett, S. H. 1907; Cadiot, P. J., Gilbert, A., & Roger, H. 1890a, b, 1894; Cameron, C. A. 1889; Courmont, J. & Dor, L. 1891; Crisp, E. 1868-69; Edwards, S. F. 1911, 1915; Elder, C. & Lee, A. M. 1925; Flourens, M. J. 1831; Fortineau, L. 1905; Gordon y de Acosta, A. 1896-97; Koch, R. 1891; Kossel, A. A., Weber, A., & Heuss, —. 1904; Lamallerée, G. 1886; MacDonald, A. 1892-93; Maffuchi, A. 1889b, 1890a, b, 1892; Milchner, R. 1904; Nocard, E. I. 1898; Ogata, T. 1896-97; Pfander, K. 1891-92; Rappin, G. 1898; Rayer, P. F. 1864; Rivolta, S. 1871; Sibley, W. K. 1888; Smith, D. T., Willis, H. S., & Lewis, M. R. 1922; Stockman, S. 1895-99; Vallillo, G. 1911-12; Vosgien, Y. 1912; Wolfhügel, K. 1904; Zschokke, E. 1900; Zürn, F. A. 1886a. Include *Gallus*. Fischel, F. 1893; Janesó, N. & Elfer, A. 1910; Römer, P. H. 1903. *Meleagris*. Sustmann, H. 1917; Wolfhügel, K. 1904. *Mycteria*. Desmarest, E. 1849. *Oidemia*. Wolfhügel, K. 1904.

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Amyloid infiltration. Kitt, T. 1883.

Body temperature. *Gallus* & *Meleagris*. Klimmer, M. & Saalbeck, —. 1910a.

Caseous degeneration. Chaussé, P. 1910.

Chemical and bacteriological study. Bouveault, L. 1892.

Development of infection. Includes *Columba* & *Gallus*. Arloing, F. 1910.

Diagnosis with tuberculin. Klimmer, M. & Saalbeck, —. 1910b.

Effect on blood cells. *Gallus*. Burckhardt, J. L. 1912.

Histology of lesions. Includes birds. Arloing, F. & Stazzi, P. 1910.

Relation to leprosy. Sibley, W. K. 1890a.

Role of lymphocytes. *Gallus*. Murphy, J. B. 1926.

Toxic effect of cultures. Freudenreich, E. 1893.

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Susceptibility. *Columba*. Murzaev, B. V. 1901a.

Transmission through eggs. Less than 1% from fowls having tuberculosis show tubercle bacillus. *Gallus*. Fitch, C. P., Lubbenhusen, R. E., & Dikmans, R. N. 1924.

Vaccination sequence. *Gallus*. Crisp, E. 1872.

World war increase. Eber, A. 1921.

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General. Aucho, B. J. & Hobbs, J. 1897; Auclair, J. 1897; Cipollina, A.

1903; Haan, J. 1908. *Columba*. Arloing, F. 1910. *Gallus*. Arloing, F. 1910; Maffuchi, A. 1889a; Smith, D. T., Willis, H. S., & Lewis, M. R. 1922.

Effect of exclusively carnivorous diet. *Gallus*. Preisich, K. 1902a, b.

Inoculation of Psittacidae with avian tuberculosis. Cadiot, P. J., Gilbert, A., & Roger, H. 1898b.

Virulence of muscle tissue when inoculated. *Gallus*. Fortineau, L. 1905.

PREVENTION AND TREATMENT

General. Bushnell, L. D. & Hinshaw, W. R. 1925-26. *Gallus*. Munce, T. E. 1926.

Tuberculin used. Egge, G. 1921.

PSEUDOTUBERCULOSIS

General. Muir, R. 1898; Sabrazès, J. E. 1899.

Lesions of parasitic nature analogous to those of tuberculosis. Transmission by digestive tract. *Gallus*. Arloing, S. & Tripièr, L. 1874.

RELATION OF AVIAN AND MAMMALIAN TUBERCULOSIS

General. Courmont, J. 1893; Jong, D. A. 1910; Koch, M. & Rabinowitsch, L. 1907; Murzaev, B. V. 1901a; Oteriopulo, O. S. 1904; Rabinowitsch, L. 1904; Van Es, L. & Schalk, A. F. 1916. *Gallus*. Courmont, J. 1893.

Susceptibility to mammalian tuberculosis. Psittaci. Murzaev, B. V. 1901c.

Avian tuberculosis

Experimental infection of birds with mammalian tuberculosis. Murzaev, B. V. 1900.

In rabbit. Kostenitsch, J. & Wolkow, M. 1893.

In swine. Christiansen, M. 1913; Day, L. E. 1919; Junack, M. 1913; Van Es, L. 1924.

Inoculation experiments

Birds with mammalian tuberculosis. Gallinae. Cadiot, P. J., Gilbert, A., & Roger, H. 1891a, b, 1895, 1898c. *Meleagris*. Cadiot, P. J., Gilbert, A., & Roger, H. 1898a.

Mammals with avian tuberculosis

General. Cadiot, P. J., Gilbert, A., & Roger, H. 1891c, 1896a.

Guinea pig with avian tuberculosis. Gilbert, A. & Roger, H. 1891.

Relation to human tuberculosis

General. Shattock, S. G., Seligmann, C. G., Dudgeon, L. S., & Panton, P. N. 1907-08. *Gallus*. Cipollina, A. 1904.

Immunity to human tuberculosis. Gallinae. Lannelongue, O. M. & Ackard, C. 1897.

Not identical with human tuberculosis. Cartier, F. 1895.

Transmission to mammals

General. Mohler, J. R. & Washburn, H. J. 1910.

Chicken to goat. Steriopulo, S. 1903.

Infection of rabbit by injection of contents of hen's egg. Artault de Vevey, S. 1895.

TUBERCULOSIS IN VARIOUS ORGANS

Air sacs. *Pelicanus*. Harrison, R. 1837.

Cecum. *Meleagris*. Gallois,—. 1862a.

Heart. Larcher, O. E. 1874a.

Intestine. *Gallus*. Schern, K. 1905.

Liver. *Gallus* & *Phasianus*. Cadiot, P. J., Gilbert, A., & Roger, H. 1890a.

Skeleton. Larcher, O. E. 1875a.

Skin. *Gallus*. Petit, G., Basset,—, & Coquet,—. 1902.

Tumors

General. Rous, F. P. 1912. *Anas*. Mukoyama, T. & Yagi, K. 1923. *Columba*. Mukoyama, T. & Yagi, K. 1923; Ohta, J. 1927. *Gallus*. Hartmann, P. J. 1689f; Kimura, Y. 1912; Kubo, H. 1923; Mukoyama, T. & Yagi, K. 1923; Skiba, O. 1910; Tyzzer, E. E. & Ordway, T. 1909; Yamagiwa, K. & Ohno, S. 1916; Yamagiwa, K., Otsuki, M., & Fukuda, K. 1913. *Serinus*. Ohta, J. 1927; Schlimpert, H. 1910. *Struthio*. Weinland, D. F. 1861a.

Action of lymphocytes. *Gallus*. Murphy, J. B. 1926.

Frequency. *Gallus*. Curtis, M. R. 1915a.

Glutathione content. *Gallus*. Ken-
naway, E. L. & Hieger, I. 1927.

Hemangioma. *Gallus*. Schürmann,
E. 1928.

Parasitic origin. Joyeux-Laffuie, J.
1895.

Spontaneous tumors. Frequency.
Gallus. Schneider, M. 1926.

Teratoid tumors in testis. Experi-
mental. *Gallus*. Michalovsky, J. 1928.

Tumor agent. *Gallus*. Mackenzie,
R. D. & Sturm, E. 1928.

EXPERIMENTAL STUDIES

General. *Gallus*. Tiesenhausen, M.
1909.

Experimental tumor formation from
embryonic grafts. *Gallus*. Féré, C.
1897c, e.

Transplantation of rat carcinoma in
brain of *Columba*. Yamazaki, K. 1922.

Tumors in embryos. Experimental
production. *Gallus*. Tur, J. 1935.

Experimental production of teratoma

General. *Gallus*. Féré, C. 1896k,
1903b; Féré, C. & Lutier, A. 1900.

Effect of change of temperature dur-
ing incubation on growth. *Gallus*.
Féré, C. 1899f.

Feathers present. *Gallus*. Féré, C.
1898c.

Persistence. Féré, C. 1898c.

Tumor in testis. *Gallus*. Michalov-
sky, J. 1926, 1928.

Grafting

General. *Gallus*. Murphy, J. B.
1912.

Grafting in developing embryo. *Gal-
lus*. Rous, F. P. & Murphy, J. B. 1911.

Metabolism of transplantable animal
tumors. Includes birds. Anon. 1923b.

New extract from transplantable
tumors. *Gallus*. Inamoto, K. 1913.

Transplantability of chicken fibroma.
Akamatsu, N. 1921.

Tumors in various organs or regions

Abdomen. Larcher, O. E. 1875b.

Brain. *Strix*. Oellacher, J. 1879.

Brain tumor of embryo adhering to
yolk. *Dromaeus* [*Dromiceius*]. Dareste,
C. 1883b.

Coccyx. *Loxia*. Paris, P. 1911b.

Joints. Includes *Gallus*. Floderus,
B. 1915.

Ovary. *Anas*. Bibra, E. 1848. *Gal-
lus*. Berner, O. 1926, 1928; May,—.
1906; Skriabina, K. 1911a. *Phasianus*.
Slater, H. H. 1879.

Skin. Abels, H. 1929. *Conurus*.
Blanchard, R. A. 1891.

Stomach. Tissue overgrowth of nail
that had penetrated stomach. *Gallus*.
Heusinger, K. F. 1822a.

Subcutaneous. Feet and beak.
Schüring, A. & Landois, H. 1895-96.

Testis. Interstitial cell tissue.
Hybrids of Gallinae. Poll, H. 1920b.

Tympanic cavity. Siphonoma.
Halieus. Doenitz, F. C. 1869a.

CARCINOMA (CANCER)

General. Anatidae. Hook, H. 1926.

Blood changes. *Gallus* & *Turdus*.
Mettam, A. E. 1908.

Medullary carcinoma. *Gallus*.
Weiskopf, H. 1882.

Rat carcinoma transplanted to brain
of *Columba*. Yamazaki, K. 1922.

Carcinoma of

Intestine. *Gallus*. Hayashi, N.,
Mukoyama, T., & Oshima, F. 1918.

Peritoneum. *Gallus*. Aihara, C.
1914.

CYSTS

Glairy cyst in the amnio-allantoic
wall. *Gallus*. Boyden, E. A. 1929.

Dermoid cysts

Feathered. *Certhia brachydactyla*.
Bonjour, S. 1889.

Parasitic. Mégnin, J. P. 1879b.

Parthenogenetic origin in ovary.
Duval, M. M. 1895.

Mucoid cysts

Amnio-allantoic wall. *Gallus*. Boy-
den, E. A. 1926.

In hypophysis. *Gallus*. Collin, R.
1926c.

SARCOMA

General. Gargano, C. 1925; Peyron, A. 1920; Roskin, G. 1926; Schmidt, M. 1863. *Passer*. Cohrs, P. 1926.

Fibrosarcoma. *Gallinae*. Galeno, A. & Canestrini, R. 1883.

Osteo-chondrosarcoma. *Gallus*. Rous, F. P., Murphy, J. B., & Tytler, W. H. 1912.

Rhabdomyosarcoma. Peyron, A. 1921a, b; Peyron, A. & Lieure, C. 1921.

Sarcomatosis. *Gallus*. Kaupp, B. F. 1918a.

Experimental studies of sarcoma

Effect of X-rays. *Gallus*. Russ, S. & Scott, G. M. 1926.

Fate of embryonic tissue mixed with transplantable sarcoma. *Anas*, *Columba*, & *Gallus*. Mukoyama, T. & Yagi, K. 1923.

Sarcoma transplanted into embryos. *Gallus*. Murphy, J. B. 1912.

Transplanting rat sarcoma into *Gallus*. Shirai, C. 1922, 1923.

Sarcoma of

Choroid layer of eye. Melanin pigment development. Includes *Gallus*. Szily, A. 1911.

Liver caused by trichosomes. Raillet, L. J. & Lucet, A. 1889.

Chicken sarcoma

General. *Gallus*. Barile, C. 1912a; Fujinami, A. & Inamoto, K. 1913; Hathaway, H. 1883; Ishibashi, M. 1913; Kimura, O. & Kimura, S. 1921; Nakahara, W. 1926; Oshima, F. 1921; Rous, F. P. 1910.

Activation. Baker, S. L. 1926.

Blood infections. Jablons, B. 1918.

Heredity. *Gallus*. Ikeda, T. 1930.

Metastases. Tadenuma, K. 1922.

Proteins. Furuhashi, T. 1921.

Relations to other tissues. Fischer, A. 1925b.

Resistance to. Fischer, A. 1925a.

Rous chicken sarcoma. *Gallus*. Mackenzie, R. D. & Illingworth, C. F. 1926.

Experimental studies

General. Kimura, T. & Wada, Y. 1923.

Action of specific blood serum. Kosugi, T. 1922.

Ferment, effect on infectivity. Baker, S. L. & McIntosh, J. 1927.

Influence of spirochaete infection. Bayon, H. P. 1928a.

Injection of chicken sarcoma. Regression and phagocytosis of muscular fibers. Peyron, A. 1921a, b; Peyron, A. & Lieure, C. 1921.

Irradiation effects. Mottram, J. C. 1928.

Grafting

Behavior when grafted into embryos. *Gallus*. Murphy, J. B. & Rous, F. P. 1912.

Effects of transplanting chicken sarcoma into brain. Arai, K. 1921, 1923.

Myxosarcoma

General. Marelli, C. A. & Ubach, F. A. 1926.

Experimental study. *Gallus*. Hayashi, N. 1913.

Typhoid fever

General. Longo, T. 1880; Palmer, C. C. & Baker, H. R. 1928; Widal, F. & Sicard, A. 1896.

Anatidae & *Columba*. Perroncito, E. 1894. *Gallus*. Beach, J. R. & Davis, D. E. 1927; Curtice, C. 1902; Edington, J. W. 1924; Kaupp, B. F. & Dearstyne, R. S. 1924a, b, 1935; Mazza, C. 1900; Perroncito, E. 1878, 1879, 1894; Taylor, W. J. 1916.

Dissemination and control. Kaupp, B. F. & Dearstyne, R. S. 1924b.

Inheritance of resistance to. *Gallus*. Lambert, W. V. & Knox, C. W. 1928.

Relation to *Bacterium pullorum*. Smith, T. & Ten Broeck, C. 1914-15.

Treatment of fowl typhoid with chemicals. Cruickshank, G. A. & May, H. G. 1928.

Typhus

General. Bochkalek, —. 1847; Ebert, R. & Schulgina, O. 1924; Mouquet, A. 1922a; Truche, C. 1923; Werdmüller,

O. 1879. *Gallus*. Kraus, E. J. 1918; Longo, T. 1880; Maggiora, A. & Valenti, G. L. 1903b, 1904; Pesch, K. L. & Schütt, H. 1924. *Meleagris*. Longo, T. 1880. *Psittaci*. Peter,—. 1892b.

Typhus in Algeria. Donatien, A., Plantureux, E., & Lestoquard, F. 1924.

Various infectious pathologic conditions not listed under specific diseases

General. Renault, E. 1850-51; Ritter,—. 1903; Wasielewski, T. K. & Hoffman, W. 1903. Cage birds. Tarmakovskaio, M. G. 1898. Includes birds. Book. Text in French. Neumann, L. G. 1888.

Columba. Enders,—. 1902; Willach, P. 1893. *Gallus*. Eggebrecht, M. 1909; Enders,—. 1902; Piana, G. P. 1876; Ramazzotti, G. 1906; Rivolta, S. & Silvestrini, A. 1873. *Phasianus*. Enders,—. 1902. *Rallidae*. Rossi, R. P. 1906. *Serinus*. Rieck, M. 1889-90; Zwick, W. 1908. *Turdus*. Maggiora, A. & Valenti, G. L. 1903a.

Ultramicroscopic organism. *Gallus*. Dubois, A. 1902.

Virulent infectious disease. Pasteur, L. 1880d.

Transmission to birds

From man. Devillers,— & Lenglen,—. 1869.

From swine. Koske,—. 1905.

FUNGUS INFECTIONS NOT LISTED UNDER SPECIFIC DISEASES

Lungs. *Gallus*. Schütz,—. 1884. *Phoenicopterus*. Mohler, J. R. & Buckley, J. S. 1904.

Mold infection. Höflich, C. 1907a, b; Yarrell, W. 1842.

Scab. *Gallus*. Schütz,—. 1884.

INFECTIONS WITH VARIOUS BACTERIA

General. Gage, G. E. 1910.

Bacillus aertrycke. *Psittaci* & *Serinus*. Beaudette, F. R. 1926.

Bacillus cloacae epidemic. *Passer*. Glenn, T. H. 1909.

Colon bacilli. Book. Text in German. Bahrdt, H. R. 1902. *Gallus* & *Meleagris*. Martel, H. 1897. *Serinus*.

Book. Text in German. Bahrdt, H. R. 1902.

Micrococcus. *Gallus*. Goodale, H. D. 1919e.

Pasteurella avisepticum. *Gallus*. Webster, L. T., Hughes, T. P., Pritchett, I. W., & Beaudette, F. R. 1927.

Spirillum. *Argas persicus*. Mezincescu, D. & Calinescu, J. 1909. *Gallus*. Cantacuzène, J. 1899; Launoy, L. & Lévy-Bruhl, M. 1913b; Mezincescu, D. & Calinescu, J. 1909.

Staphylococcus. Hasenkamp, P. & Sachweh,—. 1914.

Streptococcus. *Gallus*. Dammann, C. & Manegold, O. 1907; Greve, L. 1908.

Spirochetosis

General. Brumpt, E. 1909a, b. *Gallus*. Blaizot, L. 1909, 1910.

Carrier. *Argas persicus*. Brumpt, E. & Foley,—. 1908.

Spirochaeta anserina infection. Sakharov, N. A. 1891.

Infection with *Spirochaeta gallinarum*

Effect on leucocytes. *Gallus*. Launoy, L. & Lévy-Bruhl, M. 1913a.

Iron composition. *Gallus*. Launoy, L. 1913.

Resistance. *Gallus*. Launoy, L. & Lévy-Bruhl, M. 1913b.

PROTOZOAN INFECTION

Hematozoan infection. See also under *Parasitology*. MacCallum, W. G. 1897a, b, 1898.

Leukocytozoan infection. Walker, J. 1913b.

Intestine and liver

General. Poultry. Hadley, P. B. 1916c.

Intestinal trichomoniasis. Poultry. Hadley, P. B. 1916a.

Trypanosome infection

Relation to sleeping sickness of man. Birds incidental. Helm, R. 1914.

Trypanosoma gambiense & *T. rhodesiense*. *Gallus*. Mesnil, F. & Blanchard, R. A. 1912.

VARIOUS UNCLASSIFIED BIRD DISEASES, TREATMENT OF

General. Beeck, A. 1904; Galloway, P. F. 1918; Hohnau, A. L. 1838; *Pearl, R., Surface, F. M., & Curtis, M. R. 1911. *Gallus*. Bushnell, L. D. & Brandly, C. A. 1929.

Prevention and control. Poultry diseases. Bushnell, L. D. & Brandly, C. A. 1929; Lentz, J. W. 1922.

Sanitation and disease. Trollope, G. A. 1929.

Vaccines. Poultry. Bushnell, L. D. & Patton, J. W. 1925.

Chemicals used in controlling poultry diseases

Book. Text in German. Meinert, F. 1909.

General. Cruickshank, G. A. & May, H. G. 1928.

Metaphen as internal disinfectant. Weldin, J. C. & Weaver, H. J. 1930a.

WORM INFECTIONS

General. Caraven-Cachin, A. 1881; Wehrmann, S. 1909.

Strongylus. *Lagopus scoticus*. Books. Text in English. Leslie, A. S. & Shipley, A. E. 1912; Wilson, E. A. 1911b.

Symptoms and treatment. Arnault, C. 1927.

Syngamus trachealis. Mégnin, J. P. 1880c.

WOUNDS

Shot wounds. Donner, E. 1909.

Healing

General. *Columba*. Fiedler, J. N. 1824. Includes *Columba* & *Gallus*. Salzer, F. 1915.

Cut in interdigital membrane. *Anas*. Jolly, J. 1897.

Injured beak. *Corvus corax*. Shufeldt, R. W. 1886e.

Self-healing wound. Shot hole. *Ectopistes*. Perrin, E. 1903.

PHYSIOLOGY

Publications of a physiological nature have been listed as far as feasible in the

sections dealing with organs or under special subjects. See also under Biochemistry, Digestion, Hearing, Hibernations, Migrations, Molt, Nervous system, Nutrition, Orientation, Ossification, Reflexes, Respiration, Senses, Smell, Taste, and Vision.

Books. Text in English. Atkinson, J. 1820; Beebe, C. W. 1906a. Include birds. Carpenter, W. B. 1851; Davy, J. 1863. *Lagopus scoticus*. Wilson, E. A. 1911b.

Text in French. Berthelot, S. 1875-76; Bory de Saint-Vincent, J. B. 1822-31; Colin, —. 1888; Daudin, F. M. 1800; Milne-Edwards, H. 1857-81; Serres, A. E. 1860a.

Text in German. Bergmann, H. & Leuckart, R. 1855; Floericke, C. E. 1908-13; Gröbbels, F. 1932-37; Möllendorff, W. 1927-30, Vol. 5, pp. 55-56; Stresemann, E. 1927-34; *Winterstein, H. 1910-25. Many species. Gadow, H. F. 1891d.

General. Many species. Lucanus, F. K. 1911a. Includes birds. Szymanski, J. S. 1918. Swimming birds. Bohr, C. 1897.

Absorption. Changes in epithelium of intestinal villi with various stages. See also under Alimentary canal and Digestion. *Passer*. Biscossi, A. 1908.

Almond. Effects on absorption by intestinal epithelium. *Columba*. Screta, H. and others 1678.

Body righting. Kleitman, N. & Koppányi, T. 1926.

Daily inhalation of ethyl alcohol. Effects. *Gallus*. Pearl, R. 1917a.

Defecation. Young stork. *Ciconia*. Schuster, W. 1911c.

Effects of injecting chicken blood corpuscles into rabbits. Hirai, F. 1921.

Epidermal structures. Includes birds. Literature review. Biedermann, W. 1926.

Foreign proteins introduced by mouth into blood serum and urine. Hisanaga, T. 1923.

Hunger center in brain. *Columba*. Rogers, F. T. 1916.

Hyperthermias. Produced by experimental destruction of thalamus and by

pituitary extract. *Columba*. Rogers, F. T. 1924a.

Motor ataxia. Stimulation of production. Brown-Séquard, C. E. 1863.

Movements of neck. *Rhytidoceros*. Desselberger, H. 1930a.

Neurohumors. *Gallus*. Nolf, P. 1922.

Perspiration. Albini, G. 1895c.

Resistance to low air pressure. *Columba*. Aggazzotti, A. 1901.

Rest and activity periods in 24-hour cycle. Birds incidental. Szymanski, J. S. 1916, 1918.

Secretion of lime. Includes *Gallus*. Irvine, R. & Woodhead, S. G. 1888.

Significance of length of day. Hesse, R. 1923.

Stereotropism. Embryonic cells. *Gallus*. *Harrison, R. G. 1914.

Swallowing. Includes birds. Arloing, S. 1877.

Tenacity of life. *Delichon u. urbica*. Southwell, T. 1880.

Vasoligation of senile male. No rejuvenation resulted. *Gallus*. Crew, F. A. 1925e.

Vitality. Claim that bird lived two days without brain and upper part of spinal cord. Anon. 1829.

BLOOD PRESSURE

General. Riddle, O. 1908b; *Stuebel, H. 1910a, b. *Anas*, *Anser*, & *Gallus*. *Riddle, O. & Matthews, S. A. 1907. *Gallus*. Kaupp, B. F. 1924b; Sharpe, N. C. 1912. Includes *Gallus*. Jolyet, F. & Legerot, —. 1872.

Arterio-venous anastomoses in toes. Many species. Schumacher, S. 1915a.

Effects of drugs. *Anas*, *Anser*, & *Gallus*. *Riddle, O. & Matthews, S. A. 1907.

Effects of embryonic extracts. *Gallus*. Roffo, A. H. & López Ramírez, R. 1926.

Regulation of blood pressure. Relation to cerebral hemispheres. Experimental lesions. *Columba*. Rogers, F. T. 1920b, c.

Relation to respiration. Stuebel, H. 1910a.

COORDINATION OF MUSCLES

Relation to development of semi-circular canals. Laudenbach, J. P. 1901.

Young. *Gallus*. Thorndike, E. 1899.

ELIMINATION

Embryo. *Gallus*. Boyden, E. A. & Fiske, C. H. 1927.

Excretion or resorption of bile. Hoppe-Seyler, F. 1863.

Uric acid. Cazeneuve, P. 1881; Gibbs, O. S. 1929b; Harley, G. 1890; Pupilli, G. 1924.

Water. Effects of brain stem lesions. *Columba*. Rogers, F. T. 1923, 1924b, c.

GLYCOGENESIS

Production in blastoderm. *Gallus*. Serres, A. E. 1858.

Relation of season and sex. Includes *Columba*. Maignon, F. 1909.

HEAT

Production of

Book. Text in English. *Gallus*. Hunter, J. 1786.

General. Bohr, C. & Hasselbalch, K. A. 1903. Includes newly hatched birds. Leichtentritt, B. 1919a. *Anser*. Hari, P. 1917. *Gallus*. Brody, S., Funk, E. M., & Kempster, H. L. 1932.

Effect of age, sex, and castration on basal heat production. *Gallus*. Mitchell, H. H., Card, L. E., & Haines, W. T. 1927.

Regulation of

Function of plumage. Voit, E. 1904.

In toes. Arterio-venous anastomoses. Many species. Schumacher, S. 1915a.

IRRADIATION

Artificial light. Song birds. Schumann, A. 1901.

Continuous light. *Gallus*. Penquite, R. & Thompson, R. B. 1933.

Selective solar irradiation. Effects on parathyroid glands of chicks. *Gallus*. Higgins, G. M. & Sheard, C. 1928.

Radium irradiation

Eggs. *Gallus*. Nogier, T. 1923.

Embryo. Tur, J. 1911. *Anas*. Tur, J. 1909a. *Gallus*. Ivanov, V. S. 1911; Tur, J. 1904, 1905d, e, 1908b; *Vernoni, G. 1911.

Roentgen (X-) rays

General. *Columba* & *Gallus*. Hirata, T. 1928.

EMBRYOS

General. Gilman, P. K. & Baetjer, F. H. 1903-04. *Gallus*. Ancel, P. & Vintemberger, P. 1925a, b, c; Bordier, — & Galimard, J. 1905; Byerly, T. C. & Knapp, B. 1932; Colwell, H. A., Gladston, R. T., & Wakeley, C. P. 1922, 1926; Essenberg, J. M. 1935; Gaskell, J. F. 1911; Regaud, C., Lacassagne, A., & Tovin, T. 1925; *Strangeways, T. S. 1927.

Blastoderm. *Gallus*. Ancel, P. & Vintemberger, P. 1924a, b.

Influence of temperature on susceptibility of embryo. *Gallus*. Ancel, P. & Vintemberger, P. 1927.

Measurements of dosage. *Gallus*. Roffo, A. H. 1926.

Susceptibility of cells during mitosis. *Gallus*. Ancel, P. & Vintemberger, P. 1925c.

VARIOUS STRUCTURES

Bursa Fabricii and lymphoid tissue. Jolly, J. 1914b. *Columba*. Jolly, J. 1913b. *Gallus*. *Unzeitig, H. 1912.

Respiratory organs. Dubois, R. 1899.

Sarcoma. *Gallus*. Russ, S. & Scott, G. M. 1926.

Spleen. *Gallus*. Unzeitig, H. 1912.

Testis. *Gallus*. Benoit, J. 1924b; Unzeitig, H. 1912.

Ultraviolet light

General. *Gallus*. Murry, J. C., Little, J. C., & Bovie, W. T. 1924.

Chicks. *Gallus*. Miller, M. W., Bearse, G. E., & Cushing, G. 1933b.

Embryo. *Gallus*. *Hinrichs, M. A. 1926, 1927.

Food. Poultry. Mussehl, F. E., Hill, R. S., & Rosenbaum, J. A. 1926a.

Parathyroid glands. *Gallus*. Nonidez, J. F. & Goodale, H. D. 1927.

Tissues in tissue culture. Kiaer, S. 1925; Shimada, K. 1929.

EFFECTS ON

Egg production. *Gallus*. Hughes, J. S. & Payne, L. F. 1924; Hughes, J. S., Payne, L. F., & Latshaw, W. L. 1923.

Fecundity and fertility of eggs. *Gallus*. Hart, E. B. and others 1925.

Growth. Includes *Gallus*. Suzuki, K. & Hatano, T. 1927. Early growth rate. *Gallus*. *Goodale, H. D. 1926a.

Rachitis

General. *Gallus*. Heuser, G. F. & Norris, L. C. 1926; Hughes, J. S., Payne, L. F., & Latshaw, W. L. 1923.

Irradiation of foodstuffs. Mussehl, F. E., Hill, R. S., & Rosenbaum, J. A. 1926a.

Negative action when uropygeal gland is removed. Hou, H. C. 1931.

Value of S-1 lamp for chicks. Mussehl, F. E. & Ackerson, C. W. 1930a.

IRRADIATION OF ERGOSTEROL

Action. Include *Gallus*. Hess, A. F. & Supplee, G. C. 1930; Massengale, O. N. & Nussmeier, M. 1930; Mussehl, F. E. & Ackerson, C. W. 1930b.

Effect on calcium-phosphorus metabolism. *Gallus*. Hall, G. E. & King, E. J. 1931.

METABOLISM

Book. Text in German. *Gröbbels, F. 1932-37.

General. Aubouër, L. 1912; *Gröbbels, F. 1927f, g; Mündelein, J. 1932.

Anas. Hári, P. & Kriwuscha, A. 1918. *Columba*. Gröbbels, F. 1925b. *Columbidae*. Riddle, O., Nussmann, T. C., & Benedict, F. G. 1932. *Gallus*. Bohr, C. & Hasselbalch, K. A. 1903; Gerhartz, H. 1914; Schary, E. 1878; *Völtz, W. & Yakuwa, G. 1909. *Meleagris*. Richet, C. R. 1890. *Strix*. Albin, G. 1895b, c. *Sturnus vulgaris*. Heyder, R. 1910. Many species. *Gröbbels, F. 1920. Small birds. Lapicque, L. 1911.

Assimilation. Egg proteins. Bate-
man, W. G. 1916.

Castration, effects of. *Gallus*. Hey-
mans, C. 1921; Szuman, J. G. 1926b.

Catabolic changes. Embryo. *Gal-
lus*. Murray, H. A. 1925b.

Embryos. *Anas*. Baudrimont, A. E.
& Saint-Ange, M. 1843. *Gallus*. Baudri-
mont, A. E. & Saint-Ange, M. 1843;
Tangl, F. 1902-03, 1908a, b. *Melea-
gris*, *Numida*, & *Pavo*. Baudrimont,
A. E. & Saint-Ange, M. 1843. *Passer*.
Tangl, F. 1902-03.

Endogenous metabolism of capons
and hens compared. *Gallus*. Ackerson,
C. W., Blish, M. J., & Mussehl, F. E.
1923.

Fever. *Gallus*. Schimanski, H. 1879.

Furfurol present. *Gallus*. Jaffé, M.
& Cohn, R. 1888.

Heat production. *Anser*. Hári, P.
1917.

Humidity, effects of. Embryo. *Gal-
lus*. Romanoff, A. L. 1929c.

Incubating egg. *Gallus*. Eaves, E.
C. 1910.

Influence of N. vagus. Blobelt, P.
1926.

Liver extirpation, effects of. *Anser*.
Minkowski, O. 1886.

Manoilov reaction test. Riddle, O.
1927b.

Metabolic gradient. *Gallus*. Hyman,
L. H. 1927.

Normal and in inanition. *Strepto-
pelis*. Boussingault, J. B. 1844.

Optic thalamus. Effects of destruc-
tion. *Columba*. Rogers, F. T. & Wheat,
S. D. 1921.

Retina, metabolism of. Embryo.
Gallus. Tamiya, C. 1927.

Tissue culture studies. Burrows, M.
T. & Neymann, C. A. 1917.

Basal metabolism

General. Bohr, C. 1897. *Anas*.
Richet, C. R. 1890. *Anser*. Hári, P.
1917; Richet, C. R. 1890. *Carduelis*.
Richet, C. R. 1890. Include *Carduelis*.
Giaja, J. 1925a, b. *Columba*. Allen,
W. & Pepys, W. H. 1829; Lapicque, L.
& Lapicque, M. 1911; Richet, C. R.
1890; Riddle, O., Smith, G. C., & Bene-

dict, F. G. 1934. *Gallus*. Lapicque,
L. & Lapicque, M. 1911; Richet,
C. R. 1890. *Gallus* incidental. Trevi-
ranus, G. R. 1831b. Includes *Lanius*.
Giaja, J. 1925b. Include *Turtur*.
Giaja, J. 1925a, b. *Zenaidura*. Riddle,
O., Smith, G. C., & Benedict, F. G.
1932. Large wild birds in captivity.
Benedict, F. G. & Fox, E. L. 1927.

Effects of complete and incomplete
hypophysectomy. *Columbidae*.
Riddle, O., Smith, G. C., & Moran,
C. S. 1935.

Factor in breeding. *Streptopelia*.
Riddle, O., Smith, G. C., & Benedict,
F. G. 1933.

Feeding experiments

General. *Gallus*. Hart, E. B.,
Halpin, J. G., & McCollum, E. V.
1917.

Behavior when restricted to the
wheat or maize kernel. *Gallus*. Hart,
E. B., Halpin, J. G., & Steenbock, H.
1917.

Dried thymus and thyroid gland.
Columba. Krízenecký, J. 1928a, b.

Thyroid gland. *Gallus*. Hutt, F. B.
1930b; Willier, B. H. 1923, 1924.

Thyroxine, effects of. *Columba*. Sie-
rens, A. & Noyons, A. K. 1926.

Metabolism of various substances

Alkalies. Action on metabolism of
flesh-eating chickens. *Gallus*. Bahr-
mann, F. 1904.

Cholesterol. Experimental. *Columba*
& *Gallus*. Yamaguchi, M. 1922.

Creatine. Paton, D. N. & Mackie,
W. C. 1912.

Fat. Migrating birds. Gröbbels, F.
1928. *Gallus*. Reggiani, E. 1914.

Gas metabolism. Greater in wild
duck than in tame birds. *Anas*.
Buchanan, F. 1913.

Lipoids. Relation to calcification.
Gallus embryo. Hanes, F. M. 1912.

Minerals. *Gallus*. Mussehl, F. E.,
Blish, M. J., & Ackerson, C. W. 1927.

Protein metabolism. Developing
embryo. *Gallus*. Needham, J. 1926c.

CALCIUM

General. *Gallus*. Wheeler, W. P.
1919. Laying hen. *Gallus*. Buckner,

G. D., Martin, J. H., & Peter, A. M. 1923. "Sticky embryos." *Gallus*. Byerly, T. C. 1931.

Effect of cereals and vitamins. *Gallus*. King, E. J. & Hall, G. E. 1931.

CALCIUM AND PHOSPHORUS

General. Hall, G. E. & King, E. J. 1931; King, E. J. & Hall, G. E. 1931; King, E. J., Hull, H., & Hall, G. E. 1933.

Growing chick. *Gallus*. Buckner, G. D. & Martin, J. H. 1929; Hall, G. E. & King, E. J. 1931.

In oviduct. *Gallus*. Buckner, G. D. & Martin, J. H. 1925a.

CARBOHYDRATES

General. *Anas*. Fleming, G. B. 1913, 1919.

Vitamin-free diet, effect of. *Columba*. Funk, C. & Schönborn, E. 1914.

NITROGEN

General. *Anser*. Halliburton, W. D. 1904.

Action of adrenalin. *Anser*. Halliburton, W. D. 1904.

Embryos. Targonski, H. 1927. *Gallus*. Fiske, C. H. & Boyden, E. A. 1926.

Energy. First year. Includes poultry. Brody, S. and others 1930.

Individual variations. Poultry. Ackerson, C. W., Blish, M. J., & Mussehl, F. E. 1928b.

OSMOSIS

Shell membrane. Anon. 1874a.

Osmotic pressure

Embryo. Includes *Gallus*. Biaszewicz, K. 1912a, b.

Bile. Includes *Fulmarus*, *Larus*, & *Uria*. Portier, P. 1910.

Blood and body fluids. Includes *Fulmarus*, *Larus*, & *Uria*. Portier, P. 1907.

PULSE RATE

General. Many species. Löer, F. 1909e.

Effect of temperature. Inukai, T. 1925.

Relationship to speed of circulation of blood. Includes *Anas*, *Anser*, *Buteo*,

Corvus, *Gallus*, & *Strix*. Vierordt, K. 1858.

Significance. Includes birds. Buchanan, F. 1911.

SLEEP

Book. Text in English. Jennings, J. 1829.

General. Szymanski, J. S. 1916, 1918.

Induced by putting head under wing and swinging. *Gallus*. Féré, C. 1895f.

Position. Gurney, J. H. 1869.

PINEAL BODY OR GLAND

General. Franke, F. 1812b. Birds incidental. Julin, C. 1887. *Columba*. Mayser, P. 1894. *Gallus*. Desogus, V. 1924.

Brooding hen. *Gallus*. Desogus, V. 1926.

Development. Includes *Gallus*. Francotte, P. 1888.

Histology. Includes birds. Funkquist, H. 1912. Includes *Anas*, *Gallus*, & *Sterna*. Tilney, F. & Warren, L. F. 1919.

Morphological significance. Birds incidental. Julin, C. 1887.

Size. Includes *Gallus*. Faivre, E. 1857.

Technic for experimental study. Kolmer, W. A. 1924b.

EXPERIMENTAL EXTIRPATION

General. *Gallus*. Badertscher, J. A. 1924; Izawa, Y. 1922.

Effects on growth. *Gallus*. Yokoh, A. 1927.

Function. Author believes its chief function is to repress premature development of sexual organs. *Gallus*. Izawa, Y. 1922, 1923.

Hypertrophy of testes and comb. *Gallus*. Foà, C. 1912, 1929.

PLUMAGE

See also under Coloration, Feathers, Genetics, Growth, Integument, Molt, Regeneration, Sex, and Variation.

Books. Text in Dutch. The Netherlands. van Oort, E. D. 1922-35.

Text in English. Morris, F. O. 1880. Australia. Mathews, G. M. 1910-28. Eastern North America. Chapman, F. M. 1912b. South Africa. Stark, A. C. & Sclater, W. L. 1900-06. Alcedinidae. Sharpe, R. B. 1868-71. *Colinus*. Stoddard, H. L. 1931. Falconiformes. Swann, H. K. 1924. Nectariniidae. Shelley, G. E. 1876-80. Paradisidae. Sharpe, R. B. 1891-98. Passeriformes. British Isles. Wyatt, C. W. 1894-99. Ptilonorhynchidae. Sharpe, R. B. 1891-98. Turdidae. Seebohm, H. & Sharpe, R. B. 1898-1902.

Text in French. Boubier, M. 1926b. Europe. Temminck, C. J. 1820-40.

Text in German. Many species. Gadow, H. F. 1891d. Falconiformes. Europe. Schlegel, H. 1845. Musophagidae. Schlegel, H. & Westermann, G. F. 1860.

Text in Swedish. Sweden. Sundevall, C. J. 1856-87.

General. Bräss, M. 1886; Gadow, H. F. 1922; MacGillivray, W. 1827; Pycraft, W. P. 1900b; Stone, W. 1892. Popular account. Almack, A. C. 1866.

Apteryx. Bartlett, A. D. 1850. *Balaeniceps*. Giebel, C. G. 1873. *Barnardius*. Tavistock, M. 1917a. *Creatophora carunculata*. Meyer de Schauensee, R. 1928. *Diatryma*. Cockrell, T. D. 1923. *Heliodilus*. Milne-Edwards, A. 1878b. *Machetes pugnax*. Hornung, V. 1901. *Menura*. Ramsay, E. P. 1868. *Mergus*. Allis, T. 1832c. *Mergus merganser*. Lönnberg, A. J. 1926e. *Micropus melanoleucus*. Shufeldt, R. W. 1887g. *Nycticorax*. Cole, C. F. 1920. *Phodilus*. Milne-Edwards, A. 1878b. *Platyercus*. Tavistock, —. 1917a. *Plotus melanogaster*. Sinclair, W. F. 1899. Sphenisciformes. Lowe, P. R. 1933a. *Strix passerina*. Hellmann, A. 1853b. *Trochalopteron*. Clark, H. L. 1914.

Care. Coupin, H. 1900.

Changes. Poll, H. 1909.

Degeneration. *Struthio*. Duerden, J. E. 1920b.

Millinery trade. Chapman, F. M. 1886; Ménégau, A. 1914b.

Race differences in male but not in female. *Gallus*. Pézard, A. & Caridroit, F. 1927c.

Resistance to wetting by water. Air between feathers. Oil on feathers. Buist, G. 1857.

Sexual dimorphism. Origin. Danforth, C. H. 1930; Young, L. C. 1904.

Use of claws in oiling feathers of head. *Strix flammea*. Geyr von Schweppenburg, H. 1908.

Weight. *Gallus*. Latimer, H. B. & Pederson, L. T. 1923a.

Development

See also under Feathers.

General. *Cathartes aura*. Dennis, D. W. & Petry, W. C. 1906. *Dendroica c. caerulescens*. Harding, K. C. 1931. *Fregata aquila* & *Sula leucogastra*. Chapman, F. M. 1908.

EXPERIMENTAL STUDIES

General. *Gallus*. Landauer, W. & Dunn, L. C. 1930b.

Female plumage in ovariectomized hen with testis grafts. Greenwood, A. W. & Crew, F. A. 1926.

Ovarian extract, effects of. *Anas*. Parhon, C. J. & Parhon, C. 1923.

ANOMALIES

See also under Teratology.

General. *Miliaria*. Angelini, G. 1915.

Albinism acquired. *Gallus*. Godbey, C. B. & Reid, D. H. 1931.

Asymmetry. Not gynandromorphic. *Gallus*. Crew, F. A. 1928a.

Frizzled feathers. Study of genetics. *Gallus*. Hutt, F. B. 1930a.

Hairy feathers. *Gallinula chloropus*. Absence of barbules or of barbule hooklets. Forrest, H. E. 1901.

Persistence of nestling down on legs. *Strix novaehollandiae*. Le Souëf, W. H. 1903b.

Silky feathering. Sporadic occurrence among fowls with normal plumage. *Gallus*. Jones, S. V. 1921.

HEN-FEATHERING OF MALE

For cock-feathering see also under Sex: Intersexuality.

General. Freud, J. S., Jongh, E., & Laqueur, E. 1930; Poll, H. 1913; Wurm, W. 1899c.

Gallus. Danforth, C. H. 1928; Engelmann, F. 1914-15; Finlay, G. F. 1925; Goodale, H. D. 1913a, 1920; Goodale, H. D. & Nonidez, J. F. 1924; Morgan, T. H. 1919a, 1920a, b; Pease, M. S. 1922; Punnett, R. C. & Bailey, P. G. 1920. *Lyrurus t. tetriz*. Meyer, A. B. 1891c. *Phasianus*. Köhler, E. M. 1898; Anon. 1915a. *Ruticilla tithys*. Müller, August 1881. *Tetrao*. Engelmann, F. 1914-15; Loudon, B. 1907; Wenig, J. 1930. *Tetrao tetriz urogallus*. Lorenz, T. K. 1891, 1894b; Meyer, A. B. 1894a. *Tetraonidae*. Meyer, A. B. 1889.

Effects of castration and testis transplantation. *Gallus*. Foges, A. 1898, 1903; Morgan, T. H. 1920a.

Effects of ligation of testis. *Gallus*. Morgan, T. H. 1920b.

Genetic studies. Cunningham, J. T. 1924-25. *Gallus*. Morgan, T. H. 1920a, b, c, d.

Pathologic testes and thyroid gland. *Gallus*. Buchanan, G. 1926.

PARTS OF PLUMAGE

Contour feathers. Number in Passeres. Wetmore, A. 1936.

Ptilopody (leg-feathering). *Gallus*. Danforth, C. H. 1919a, 1929.

Crests

Concealed crests. Use in alluring insects. Nutting, C. C. 1893.

Development. *Anas* & *Gallus*. Book. Text in German. Krautwald, F. 1910.

Ornamental crests. Birds of prey. Goodchild, J. G. 1891b.

Display plumage

General. *Erhard, H. 1923, 1924.

Breeding, variation. *Pavoncella pugnax*. Csörgey, T. 1922.

Display patches. Short, stiff feathers from which portions have broken away. *Centrocercus*. Horsfall, R. B. 1920.

Tail feathers

ELONGATION

Cause. Jäckel, A. J. 1861.

Enormous length. Long-tailed fowl of Japan. Forbin, P. 1908.

Plumes. *Paradisaea*. Marshall, W. A. 1871, 1873.

VERTICAL ARRANGEMENT

General. *Muscicapa*. Wied-Neuwied, M. A. 1821.

Wing plumage

General. Sundevall, C. J. 1846b. Many species. *Sundevall, C. J. 1886.

Aquintocubitalism. *Pycraft, W. P. 1899d. *Columbae*. *Mitchell, P. C. 1899.

Cubital coverts. *Paradisaeidae*, *Philonorhynchus*, & *Schlegelia*. Stejneger, L. H. 1891.

Eutaxy. Fifth secondary as well developed as adjacent secondaries. Pycraft, W. P. 1899d, 1902a; *Steiner, H. 1916. *Alcedinidae*. Mitchell, P. C. 1901b. *Columbae*. *Mitchell, P. C. 1899.

Reversed wing coverts. Birds of West Africa. Bates, G. L. 1918.

Secondary feathers. Number. Seebohm, H. 1887. Tertiary feathers. Weights. Magnan, A. 1912g.

PRIMARY FEATHERS

Enormous elongations. *Cosmetornis vexillarius* & *Macrodipteryx macrodipterus*. Pycraft, W. P. 1904c.

Lateral extension of vane. *Anatidae*. Stubbs, F. J. 1910a.

Number. Many species. Sundevall, C. J. 1843.

Pelvic wing. Group of feathers across upper part of hind leg and extending toward tail. First described by Beebe, C. W. 1915. *Gallus*. Lippincott, W. A. 1920c.

Spurious primaries. *Vireo*. Batchelder, C. F. 1878.

PHYSIOLOGY

Experimental modification

Liver feeding. Many species. La Riboisière, J. 1908.

Production of hen-feathering by feeding thyroid. Horning, B. & Torrey, H. B. 1923; Torrey, H. B. & Horning, B. 1922, 1925c.

Temperature and humidity effects. *Coturnix*. Cavazza, F. 1912a, b.

Thyroidectomy effects. Crew, F. A. 1927a.

INDUCTION OF PREMATURE MOLT

General. *Gallus*. Vallbort, G. & Walkowa, A. 1925.

Color pattern intermediate between third juvenal and adult plumage produced by induced molt, pulling feathers. *Plotus*. Heinroth, O. 1900b.

SEX HORMONE EFFECTS

General. *Gallus*. Morgan, T. H. 1920a, b, c. *Pyromelana franciscana*. Witschi, E. 1936.

Castration. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1926b.

Castration produces change to cock-feathering. *Gallus*. Morgan, T. H. 1920a, b.

Effect of interstitial cells. *Gallus*. Benoit, J. 1928b.

Relation to luteal cells. *Gallus*. Goodale, H. D. & Nonidez, J. F. 1924.

Function

Changing specific gravity for swimming and diving. Stubbs, F. J. 1910b.

Function in heat regulation. Voit, E. 1904.

Thymus gland extract, effects of. Nevalonnyj, M. 1927b.

PTERYLOSIS

Publications dealing with feather patches (pterylae).

Books. Text in English. Gadow, H. 1891c; Seebohm, H. 1890c. Many species. Beddard, F. E. 1898b.

Text in French. Boubier, M. 1926b.

Text in German. Naumann, J. F. 1905; *Nitzsch, C. L. & Burmeister, C. C. 1840; Reichenow, A. 1913; Stresemann, E. 1927-34. Many species. Gadow, H. 1891d.

General. Acloque, A. 1909; Beddard, F. E. 1899a; Beebe, C. W. 1915; Clark, H. L. 1902b, c, 1918a; Engel, J. 1857; Fehringer, O. 1912; Holland, T. 1861, 1864; Jacquemin, E. 1836a, c; Kosmak, G. W. 1894; Meijere, J. C. 1895; Pycraft, W. P. 1902a; Scherren, H. 1903; *Steiner, H. 1916. Many species. Clark, H. L. 1918c; Lucas, F.

A. 1894c; Nitzsch, C. L. 1806; Reichenow, A. 1877b; Ticehurst, C. B. 1908a.

Aechmorrhynchus cancellatus. Lowe, P. R. 1927. *Ardeidae*. Schaub, S. 1908. *Bradypterus*. Pycraft, W. P. 1910b. *Bucconidae*. Forbes, W. A. 1882b. *Buceros*. Shelford, R. W. 1899. *Caprimulgi*. Clark, H. L. 1895, 1901b. *Carpococcyx*. Beddard, F. E. 1901c. *Centropus sinensis*. Shelford, R. W. 1900. *Ceophloeus*. Clark, H. L. 1893c. *Certhidia*. Snodgrass, R. E. 1903. *Charadriidae*. Lowe, P. R. 1916b. *Chlorophonia*. Clark, H. L. 1913a. *Chunga*. Beddard, F. E. 1889c; Schaub, S. 1914. *Circus*. Chandler, A. C. 1914b. *Cochleariidae*. Murie, J. 1872b. *Cocornis*. Snodgrass, R. E. 1903. *Coerebidae*. Lucas, F. A. 1894c, 1895c. *Colius*. Pycraft, W. P. 1907e. *Colymbus a. arcticus*. Pycraft, W. P. 1909b. *Cuculidae*. *Beddard, F. E. 1885d. *Cyanocitta cristata*. Peck, M. E. 1900. *Cypselidae*. Shufeldt, R. W. 1893a. *Didus*. Moseley, H. N. 1885. *Disoura*. Beddard, F. E. 1896b. *Ectopistes*. Clark, H. L. 1918b. *Euphonia*. Clark, H. L. 1913a. *Eurynorhynchus pygmaeus*. Anderson, J. 1879b. *Eurypygidae*. Murie, J. 1872b. *Falconiformes*. Blasius, J. H. 1864. *Galbulidae*. Forbes, W. A. 1882b. *Gallus*. Landauer, W. 1930b; Landauer, W. & Dunn, L. C. 1930b. *Geococcyx*. Shufeldt, R. W. 1886b. *Geospiza*. Snodgrass, R. E. 1903. *Gymnorhina*. Degen, E. 1903. *Heliornis*. Beddard, F. E. 1893. *Hirundo rustica*. Hellmann, A. 1856. *Indicator*. Garrod, A. H. 1878c. *Lanius ludovicianus*. Miller, A. H. 1928. *Leptosoma discolor*. Forbes, W. A. 1880c; Sclater, P. L. 1865c. *Loxia*. McCabe, T. T. & McCabe, E. B. 1933. *Megacephalon*. Garrod, A. H. 1878e. *Megapodidae*. Flynn, T. T. 1910; Oustalet, J. F. 1880a. *Megapodius*. Pycraft, W. P. 1900a. *Melanerpes torquatus*. Shufeldt, R. W. 1888b. *Mesites* [*Mesoenas*]. Forbes, W. A. 1882e; Lowe, P. R. 1924; Schaub, S. 1914. *Micropodidae*. Shufeldt, R. W. 1902c. *Micropodiformes*. *Clark, H. L. 1906b. *Nycticorax n. hoacili*. Gross, A. O. 1923a. *Opisthocomus*. Beddard, F. E. 1889a; Pycraft, W. P. 1895b. *Opisthocomus cristatus*. Perrin, J. B. 1877; Shufeldt, R. W. 1918a. *Palaeognathae*. Beebe, C. W. 1906a. *Paradisaea*. Giebel, C. G. 1877a; Pycraft, W. P. 1905b. *Paridae*. Forbes, W. A. 1881e. *Passeres*. Dwight, J. 1900d. *Patagona gigas*.

*Thompson, D. W. 1901. Phasianoidae. Clark, H. L. 1899. *Phoenicopterus*. Gadow, H. F. 1877a. *Photodilus*. Beddard, F. E. 1890d; *Pycraft, W. P. 1903d. Pici. Beddard, F. E. 1896c. Picidae. Burt, W. H. 1929; Shufeldt, R. W. 1888c. *Podargus*. Clark, H. L. 1901b. *Podiceps*. Beddard, F. E. 1890c. *Podiceps*. Ghigi, A. 1907b. Procnatiidae. Lucas, F. A. 1896d. Psittaci. Forbes, W. A. 1879. *Psophia*. Schaub, S. 1914. *Rhea*. Zander, R. 1889. Rhinocetidae. Murie, J. 1872b. *Rhinocetus*. Burkhardt, R. 1901; Schaub, S. 1914. *Rhodinocichla*. Clark, H. L. 1913c. *Rhytidoceros*. Shelford, R. W. 1899. *Salinator*. Clark, H. L. 1913a. *Scolopax*. Lowe, P. R. 1927. *Scopus*. Beddard, F. E. 1884. *Sicalis*. Clark, H. L. 1914. *Speotyto*. Shufeldt, R. W. 1889b. Spheniscidae. Anthony, R. L. & Gain, L. 1913a. *Sphenura*. Hall, R. 1912. *Spindalis*. Clark, H. L. 1913b. *Steatornis*. Garrod, A. H. 1873c. *Steatornis caripensis*. Murie, J. 1873a. *Strepera*. Leach, J. A. 1914. Strigidae. Beddard, F. E. 1890d; Clark, H. L. 1895; *Pycraft, W. P. 1898a. *Strix passerina*. Hellmann, A. 1853b. *Struthio*. Duerden, J. 1912b, 1919e, 1920b; Nessonow, N. V. 1895b. *Tetragonops*. Giebel, C. G. 1878. Tinamiformes. Pycraft, W. P. 1895a. *Todus*. Clark, H. L. 1913b. Trochilidae. Clark, H. L. 1902a; Shufeldt, R. W. 1893a, 1902c. *Troglodytes*. Boulton, R. 1927. Trogonidae. Clark, H. L. 1918a. *Turacus*. Pycraft, W. P. 1904b. Turdidae. Pycraft, W. P. 1905d.

Embryos. *Centropus sinensis*. *Shelford, R. W. 1900.

Hackles fowl. Greenwood, A. W. 1927.

Nestling birds. *Centropus sinensis*. *Shelford, R. W. 1900. *Corvus*. Dunlop, E. B. 1911b; Ingram, C. 1919a. *Motacilla* & *Parus*. Ingram, C. 1919a. *Rhinocetus*. Burkhardt, K. R. 1900, 1901a, b. *Turdus*. Ingram, C. 1919a.

Relation to skin muscles. Helm, A. F. 1884.

Taxonomic bearing. Clark, H. L. 1901a, 1902b; Nitzsch, C. L., & Giebel, C. G. 1862b; Sundevall, C. J. 1842, 1846b. *Chamaea*. Shufeldt, R. W. 1889e. Passeres. Wallace, A. R. 1874.

VARIOUS PARTS OR AREAS

Foot. Many species. Reichenow, A. 1871.

Naked area on forehead and at base of beak. *Corvus frugilegus*. Waterton, C. 1832f.

Wing

General. Reichling, H. 1915; *Wray, R. S. 1887b. Many species. Pycraft, W. P. 1890; Sundevall, C. J. 1846b.

Cubital coverts. Goodchild, J. G. 1886, 1891a, 1894.

Ptilosis

Publications dealing with "ptilosis," a term with variable use, applied sometimes to texture of feathers, or to development of pterylae, or as a synonym for pterylosis.

Book. Text in Latin. Wagler, J. G. 1827.

General. Holmes, A. 1935. *Gallus*. Juhn, M. & Fraps, R. M. 1934; Warren, D. C. 1925. *Rhinorchilus* & *Leucolepis thoracicus*. Miller, W. D. 1924a.

Diastataxy. Miller, W. D. 1915; Mitchell, P. C. 1901b; Pycraft, W. P. 1899d, 1902a.

Eutaxy. Miller, W. D. 1915; Mitchell, P. C. 1901b.

Wing. Miller, W. D. 1915.

SEQUENCE OF PLUMAGES

Books. Text in Dutch. Schlegel, H. 1859. Holland. van Oort, E. D. 1922-35.

Text in English. Allen, G. M. 1925; Chapman, F. M. 1912b; Coues, E. B. 1877; Oates, E. W. 1883; Skinner, M. P. & Achorn, J. W. 1928; Townsend, C. W. 1912b; Witherby, H. F. and others 1920-24. *Lagopus scoticus*. Wilson, E. A. 1911b.

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Isabellism in winter. *Anas*. Hänish, R. 1902.

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Alaska. Hersey, F. S. 1917.

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Oklahoma. State University campus. Nice, M. M. 1930b.

Peru, coast. Murphy, R. C. 1923b.

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Area with radius of 10 miles. Hess, I. E. 1910.

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One square mile. Pennsylvania. Burns, F. L. 1901a.

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Roadside. Arkansas-Oklahoma. Nice, M. M. & Nice, L. B. 1921.

Strip across Illinois. Forbes, S. A. 1908.

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CHANGES IN POPULATION

California. Grinnell, J. 1922b.
Massachusetts. Forbush, E. H. 1912.
New Jersey coast. Stone, W. 1926.

Causes. Galli-Valerio, B. 1910.

Extension of range. *Passer*. Ballou, W. H. 1880a. *Ciconia c. ciconia*. Grote, H. 1925b.

Species population. *Phalacrocorax a. auritus*. Lewis, H. F. 1931.

Changes caused by civilization

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Agricultural development in Wyoming. Influence upon bird population. Grove, B. H. 1913.

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Irrigation. Bailey, F. A. 1910a; Baker, C. F. 1896; Kennedy, C. H. 1914.

Decrease in population

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Comparison with wild birds. Tolenaar, D. 1922a.

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Correlation tables. Seasonal and annual. Hervey, G. W. 1924.

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Hatchability of eggs produced by mothers. Jull, M. A. & Byerly, T. C. 1933.

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Sex ratio. Callenbach, E. W. 1929.

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Body characters

General. Sherwood, R. M. 1922.

External body characters. Hervey, G. W. & Lewis, H. R. 1924.

Keel bone. Asmundson, V. S. 1921.

Size. Knox, C. W. & Bittenbender, H. A. 1927; Waters, N. F. 1926.

Skull measurements. No correlation between skull measurements and mean length of egg-laying cycle or egg production for first year. Marble, D. R. 1932.

Temperature of body. Fronda, F. M. 1921, 1923.

Pigmentation of body

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Yellow pigment in integument of legs and beak. *Blakeslee, A. F. & Warner, D. E. 1915.

Weight of body

General. Platt, C. S. 1927.

Number and weight of eggs and body weight. Atwood, H. & Clark, T. 1930.

PERIOD

First and second year production. Harris, J. A. & Lewis, H. R. 1922a, b, c.

Inter-periodic. Harris, J. A. 1926a; Harris, J. A., Blakeslee, A. F., & Kirkpatrick, W. F. 1917.

Periods of laying in first and second years. Harris, J. A. & Lewis, H. R. 1923b.

Various periods of year. Harris, J. A. & Blakeslee, A. F. 1918.

SEXUAL MATURITY

General. Kempster, H. L. 1925, 1926; Kempster, H. L. & Henderson, E. W. 1921.

Body weight and age at sexual maturity. Hays, F. A. 1933a.

Increase in egg weight and time when laying begins. Jull, M. A. 1925a.

Time of hatching and of reaching maturity. Kempster, H. L. 1921.

Weight at sexual maturity. Hays, F. A. 1933b.

Age at first laying

Size of first egg. Lippincott, W. A. 1921b.

Weight of eggs during first laying year. Lippincott, W. A., Parker, S. L., & Schaumburg, L. 1925.

Early maturity

General. Buster, M. W. 1923, 1927.

High correlation. Hays, F. A. & Bennett, J. S. 1923.

WEIGHT

General. Jull, M. A. 1930a.

Weight of eggs and time of laying. Atwood, H. 1929.

Cycles of egg production

General. Harland, S. C. 1927.

Cycles and rhythm. Patterson, C. T. 1916.

Period of decrease. Fauré-Fremont, E. & Kaufman, L. 1926.

Pullets hatched at various periods. Buss, W. J. 1918.

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WINTER EGG PRODUCTION

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General. Labbe, E. H. 1925; Stewart, J. H. & Atwood, H. 1910.

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Horse dung. Anon. 1781.

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Changes in rate of egg production. Pearl, R. 1914b.

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General. Amicis, C. 1923; André,—. 1917; Arnost, A. 1905; Arnoux, A. 1916;

Bernegau, L. 1899; Bertarelli, E. 1917; Beythien, A. & Waters, L. 1906; Bordas, F. 1922; Calvert, F. G. 1873; Drechsler, G. 1896; Filippini, A. 1918; Jeffrey, J. S. 1905; Kuhl, H. 1919; Ladd, E. F. 1899; Lamson, G. H. 1909, 1911; Macomber, H. I. 1919; Passerini, N. 1919; *Prall, F. 1907; Réaumur, R. A. 1738; Roberts, I. P. 1891; Rompant, L. 1917; Schuette, O. 1907; Thatcher, R. W. 1905; Zörkendörfer, C. 1892-93.

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General. Stewart, J. H. & Atwood, H. 1902a.

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Mortality of embryos. Hannas, R. R. 1917.

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General. Beach, J. R. & Freeborn, S. B. 1922; Cram, E. B. 1928.

Intestinal parasites. Control. Ireland, J. W. & Lamb, A. R. 1926.

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General. Control. Herrick, G. W. 1915.

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Daubentonia. Shealy, A. L. & Thomas, E. F. 1928.

Potassium nitrate. Guberlet, J. E. 1922.

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VIGOR

Flocks bred for high egg production. Hays, F. A. & Sanborn, R. 1928.

Relation to age of parents. *Gallus*. Atwood, H. 1909.

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Including Biometry. See also under Growth, Population, Variation, and measurements and weights in various other sections.

Books. Text in French. Leuret, F. & Gratiolet, P. 1839-57.

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Size of first egg. *Gallus*. Lippincott, W. A. 1921b.

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Body size and

Climate. Includes birds. Boetticher, H. 1913.

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Size of brain. Includes birds. Dubois, E. 1914.

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Brain weight and

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General. *Gallus*. Halbersleben, D. L. & Mussehl, F. E. 1922.

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Book. Text in English. North American birds. Baldwin, S. P. & Oberholser, H. C. 1931.

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LAMINATED CORPUSCLES, MEASUREMENTS OF

Grandry corpuscles. *Anas*. Krause, W. 1881a.

Pacinian corpuscles. Herbst, G. 1851.

MUSCLE FIBERS, MEASUREMENTS OF

General. *Gallus*. *Lebert, H. 1849a.

Amount of smooth muscle tissue in gizzard. Magnan, A. 1911c, 1912p.

Skeletal muscle fibers

General. Includes *Carduelis*. Mayeda, R. 1890.

Light and dark skeletal muscle fibers. Includes *Columba*. Ewald, W. 1912.

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General. Böker, H. 1927a, 1929.

Wing

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Pectoral girdle

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Coracoscapular angle. *Gallus*. Nauck, E. T. 1930b.

Furcula. Many species. Weitzel, A. 1865.

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VISCERA, MEASUREMENTS OF

Book. Text in German. Rensch, B. 1930.

General. Custor, J. 1873. *Gracula*. Cabot, S. 1851. *Struthio*. Weinland, D. F. 1861a. *Tetrao*. Cabot, S. 1846a.

Arteries. *Gallus*. Thoma, R. 1901b.

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Respiratory surface of lungs. Includes *Columba*. Sussdorf, M. 1907.

Spleen. Magnan, A. & La Riboisière, J. 1911. Book. Text in German. Müller, W. 1865.

Suprarenal glands. Cortex and medulla. *Gallus*. Latimer, H. B. & Landwer, M. F. 1925.

Trachea. *Tantalus*. Swinhoe, R. 1867. Hybrid—*Clangula* × *Mergus*. Cabot, S. 1856.

Digestive organs

General. *Chionis*. Cunningham, R. O. 1869.

Epithelial cells of liver. Includes *Anas*, *Gallus*, & *Strix*. Leidy, J. 1848.

Alimentary canal

General. Struthious birds. Crisp, E. 1864a. *Anser* & *Columba*. Kaiser, H. 1925. *Nyroca leucophthalmus*. Smith, J. A. 1858c.

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Mucosa surface area. *Columba*, *Gallus*, & *Serinus*. *Crampe, H. 1872. Many species. Magnan, A. 1911d.

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Relative lengths of small intestine in male birds and in birds of different age and feeding habits. Many species. Stevenson, J. 1933.

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Relation to diet. *Magnan, A. 1912c.

Surface of mucosa. *Anas*. Magnan, A. 1911c, 1912p.

Testis

General. Montlezun, A. 1900. Sexually mature testis. *Gallus*.

Freund, L. 1909. Changes in size. *Colaeus monedula*. *Stieve, H. 1919a.

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Death Valley. Grinnell, J. 1923.

Guatemala. Van Tyne, J. 1935.

South Australia. Many species. Morgan, A. M. 1919, 1920, 1922.

Anas. Phillips, J. C. 1912b. *Anatidae*. Cornevin, C. E. & Lesbre, F. X. 1894. *Aquila*. Hallam, W. W. 1917. *Bonasa*. Gross, A. O. 1928. *Columba*. Rheinisch, B. 1910; Riddle, O. 1922; Rogers, F. T. & Wheat, S. D. 1921. *Falco sparverius*. Sherman, A. R. 1913b. *Gallus*. Hallam, W. W. 1917; Latimer, H. B. & Pederson, L. T. 1923a. *Hylocichla*. Perry, W. A. & Perry, E. M. 1918. *Hypoleucis*. White, S. A. 1918. *Ionornis martinicus*. Gross, A. O. & Van Tyne, J. 1929. *Meleagris*. Latimer, H. B. & Rosenbaum, J. A. 1926. *Microcarbo*. White, S. A. 1918. *Poocetes g. gramineus*. Perry, W. A. & Perry, E. M. 1918. *Tringa*. Cordeaux, J. 1889; Gurney, J. H. Jr. 1889e.

Changes in body weight. *Columbidae*. Riddle, O., Smith, G. C., & Benedict, F. G. 1934.

Effect of experimental diet. *Anas*. Magnan, A. 1912m.

Embryos. *Gallus*. Fridericia, L. S. 1912; Pütter, A. 1917.

Feeding anterior lobe of bovine hypophysis. *Gallus*. Winternitz, M. E. 1919.

Healthy and unhealthy birds. *Lagopus*. Wilson, E. A. & others 1911b.

Heaviest flying bird. *Otis t. tarda*. Harting, J. E. 1899.

Hybrids. *Anas*. Phillips, J. C. 1914c.

Loss of weight in daytime compared with night. Albini, G. 1895a.

Precision in weighing hens. Amount worth while. *Gallus*. Card, L. E. 1921b.

Relation to age and sex. Helgoland migrating birds. Weigold, H. 1926.

Sex comparisons. *Gallus*. Romanoff, A. L. 1933b.

Standardization of poultry experiments. *Gallus*. Kandel, H. C. 1923.

Stomach contents. *Melospiza*, *Passer*, *Sitta*, & *Sturnus*. Stevenson, J. 1933.

Young. *Aquila chrysaetos canadensis*. Sumner, E. L. 1929. *Gallus*. Upp, C. W. 1928a.

Growth comparisons

General. *Gallus*. Brody, S. 1926; Latimer, H. B. 1923, 1924a, b, 1925a, b, c, 1927, 1932. *Hirundo erythrogaster*. Stoner, D. 1935b.

Brain. *Gallus*. Latimer, H. B. 1924a.

Gonads and bursa Fabricii. *Columbidae*. Riddle, O. 1928b.

At hatching, 35 days, and maturity. *Gallus*. Latimer, H. B. 1924b.

Skeleton. *Gallus*. Latimer, H. B. 1923, 1927.

Specific gravity

General. Include birds. Davy, J. 1860, 1862.

Eggs. Fryer, H. F. 1900; Gröbbels, F. 1927h. *Gallus*. Pearl, R. & Surface, F. M. 1914a.

Muscle. *Columba* & *Gallus*. Carvallo, J. L. & Weiss, G. 1889.

Weights of various structures

General. *Anser* & *Fringilla*. Welcker, H. & Brandt, A. 1903. *Gallus*. Souba, A. J. 1923; Wagner, E. 1924; Welcker, H. & Brandt, A. 1903; Zaitschek, A. 1908. *Meleagris*. Latimer, H. B. & Rosenbaum, J. A. 1926. *Parus*, *Regulus*, & *Troglodytes*. Welcker, H. & Brandt, A. 1903.

Bones. Hiller, E. 1884; Schneider, M. & Dunn, L. C. 1924.

Center of gravity. Experimental. Zimmer, K. 1935b.

Effects of feeding anterior lobe of bovine hypophysis. *Gallus*. Winternitz, M. C. 1919.

Endocrine glands. *Gallus*. Juhn, M. & Mitchell, J. B. 1929.

Excreta in 24 hours. Dann, A. B. 1923.

Pectoral muscles. Edwards, C. L. 1886; Harting, P. 1869.

Sex comparisons. *Gallus*. Romanoff, A. L. 1933b.

Spinal cord at various stages in development. *Gallus*. *Latimer, H. B. 1925b.

Thyroid gland. Pettit, A. 1898; *Schepelmann, E. 1906.

Uropygeal gland. *Schepelmann, E. 1906.

Wing. Many species. Magnan, A. 1911f, 1912l.

BLOOD

Various groups. Magnan, A. 1912d.

Variation. *Gallus*. Latimer, H. B. & Pederson, L. T. 1923a.

BRAIN

General. Kuenzi, W. 1918; Lapique, L. 1909. Many species. Hancock, J. L. 1888b, 1890b. Include birds. Hrdlička, A. 1905; Waterlot, G. 1912.

Aquila chrysaetos canadensis. Hallam, W. W. 1917. *Colinus*. Dubois, E. 1919a. *Gallus*. Dubois, E. 1919a; Hallam, W. W. 1917. *Passer*. Dubois, E. 1919a. *Phoenicopterus*. Ziehen, G. T. 1904.

Chemical compounds of brain. Includes *Columba* & *Phasianus*. Book. Text in German. Bibra, E. 1854.

Compared with human. Hancock, J. L. 1887.

Immersed in saline solutions. *Loxia*. Wessberge, H. 1913, 1914.

Parts of brain. Many species. Lapique, L. & Girard, P. 1906.

Sex differences. Includes *Passer*. Lapique, L. 1907a.

Various stages in development. *Gallus*. *Latimer, H. B. 1925b.

EGG

Book. Text in English. Many species. Bergtold, W. H. 1917a.

General. Bergtold, W. H. 1929; Davy, J. 1864b; Foster, N. H. 1902; Fridericia, L. S. 1912; Fryer, H. F. 1900; Goebel, H. & Ottosson, O. 1908; Gröbbels, F. & Mobert, F. 1927b; Hoxie, W. 1887b; Jull, M. A. 1924a; Kutter, O. F. 1881; Schiller-Tietz, N. 1901; Schuster, L. 1925a; Schuster, M. J. 1878. Many species. Bauer, R. W. 1903; Hanna, W. C. 1924; Moquin-Tandon, C. H. 1859.

Accentor. Workman, W. H. 1901. *Buteo buteo*. Pousar, V. 1909. *Carpodacus mexicanus frontalis*. Bergtold, W. H. 1914. *Charadriiformes*. Buchanan, K. & Buchanan, R. M. 1904. *Cypselus*. Workman, W. H. 1901. *Falco sparverius*. Sherman, A. R. 1913b. *Fringilla* & *Gallinula*. Workman, W. H. 1901. *Gallus*. Dudley, F. J. 1931; Féré, C. 1895e; Jull, M. A. 1924a; Kopeč, S. 1924; Luca, S. 1865; Upp, C. W. 1928a; Zürn, F. A. 1886b. *Ligurinus*, *Passer*, & *Pica*. Workman, W. H. 1901. *Turdus*. Domeier, H. & Pousar, V. 1909; Workman, W. H. 1901.

Abnormal egg. Condorelli Franca-viglia, M. 1923.

Before and after hatching. Camus, L. 1904.

Cooked eggs. Zürn, F. A. 1886b.

Different breeds and seasons. *Gallus*. Mairs, T. I. 1908.

During incubation. Gröbbels, F. 1927h; Gröbbels, F. & Mobert, F. 1927a; Ritter, W. E. & Bailey, S. E. 1908.

Standard deviation. *Gallus*. Atwood, H. 1925.

Variation in successive layings. *Gallus*. Féré, C. 1898d.

Weights of parts of eggs

General. *Gallus*. Jull, M. A. 1924a; Tangl, F. 1908a, b.

Egg elements. *Gallus*. Voit, C. 1877.

Hybrids. *Anatidae*. Loisel, G. 1905a.

Parts of Chinese preserved eggs. Blunt, K. & Wang, C. C. 1916.

Various parts of egg and embryo sixth to twentieth days of incubation. *Gallus*. Fangauf, R. 1928.

Albumen

General. Friese, W. 1923; Zürn, F. A. 1886b. Includes birds. Valenciennes, A. & Frémy, E. 1857. *Gallus*. Bauer, R. W. 1893; Curtis, M. R. 1912. *Meleagris* & *Vanellus*. Bauer, R. W. 1893.

Cooked eggs. Zürn, F. A. 1886b.

Shell

General. Friese, W. 1923; Schuster, L. 1925a. *Gallus*. Bauer, R. W. 1893; Curtis, M. R. 1912; Fridericia, L. S. 1912; Zürn, F. A. 1886b. *Meleagris* & *Vanellus*. Bauer, R. W. 1893.

Before and after hatching. Camus, L. 1904.

Yolk

General. Friese, W. 1923. *Gallus*. Bauer, R. W. 1893; Curtis, M. R. 1912; Zürn, F. A. 1886b. *Meleagris* & *Vanellus*. Bauer, R. W. 1893.

Unassimilated yolk at hatching. *Gallus*. Jull, M. A. & Heywang, B. W. 1930.

Yolk and albumen ratios compared in precocial and altricial birds. *Tarkhanov, I. R. 1883c.

PLUMAGE

General. Carinatae. Magnan, A. 1911a. *Gallus*. Latimer, H. B. & Pederson, L. T. 1923a.

Down feathers. Magnan, A. 1912g.

Rectrices. Carinatae. Magnan, A. 1912f.

Remiges. Various groups. Magnan, A. 1912e.

Tertial feathers. Magnan, A. 1912g.

VISCERA

Book. Text in German. Rensch, B. 1930.

General. *Ardea*, *Hierofalco*, & *Pandion*. Magnan, A. 1911i.

Intestine. *Schepelmann, E. 1906.

Lungs. *Schepelmann, E. 1906.

Pancreas. Magnan, A. 1910b, 1911e; *Schepelmann, E. 1906.

Spleen, suprarenal glands, and thyroid gland. *Schepelmann, E. 1906.

Stomach. Variations with diet. *Anas*. Magnan, A. 1912p.

Heart

Book. Text in German. Tropical birds. Rensch, B. 1930.

General. Many species. *Löer, F. 1911.

At high altitudes. *Lagopus*. Strohl, J. 1910b, c, d.

Kidneys

General. Magnan, A. 1911g; *Schepelmann, E. 1906.

After bleeding in relation to diet. Magnan, A. 1912o.

Dietary effects. *Anas*. Magnan, A. 1912q.

Liver

General. Magnan, A. 1910b; *Schepelmann, E. 1906. Many species. Magnan, A. 1911e. *Gallus*. Latimer, H. B. & Pederson, L. T. 1923a.

After bleeding. Magnan, A. 1912h.

Birds fed with diet lacking glycogen. Magnan, A. 1912i.

Variation. *Gallus*. Latimer, H. B. & Pederson, L. T. 1923a.

Reproductive organs

General. *Schepelmann, E. 1906.

Gonads

General. Many species. *Bergtold, W. H. 1926a.

Developing ovary. *Gallus*. Stieve, H. 1918.

Loss of weight during period preceding breeding season. *Anser*. Stieve, H. 1922b.

Testes. *Anser* & *Colaeus*. Stieve, H. 1921.

REFLEXES

See also under Behavior, Brain, Eye, Nervous system, and Physiology.

Books. Text in English. Includes birds. Hobhouse, L. T. 1915.

Text in German. Birds incidental. Ziehen, G. T. 1914.

General. Gröbbels, F. 1927i; Her- rick, F. H. 1909; Lorenz, K. 1932. *Columba*. Beritoff, J. 1926; *Gröb- bels, F. 1922c. *Gallus*. Young birds.

Thorndike, E. L. 1899. *Larus*. *Gröbbels, F. 1922c.

Co-ordination. *Anas*, *Columba*, & *Gallus*. *Clementi, A. 1910, 1913.

Locomotor. Baglioni, S. 1907.

Reaction time. Numerous figures. *Columba*. Dittler, R. & Garten, S. 1918.

Static and stato-kinetic reflexes. *Anas*. Koppányi, T. & Kleitman, N. 1927a. *Gallus*. Kleitman, N. & Koppányi, T. 1926.

Tonic reflex. *Columba*. Benjamins, C. E. & Huizinga, E. 1927. *Gallus*. Kleitman, N. & Koppányi, T. 1926.

CONDITIONED REFLEXES

General. *Columba*. Tjumjanzeff, N. F. 1931.

Association of feeding and defecation in young birds. *Troglodytes*. Reed, C. I. & Reed, B. P. 1925.

Sound. *Columba*. Tjumjanzeff, N. F. 1931.

FEEDING REFLEXES

General. In young birds. Leichtenritt, B. 1919b.

Opening of mouth in feeding. Relation to defecation. Gröbbels, F. 1927i.

FLEXION REFLEXES

General. Nishihata, T. 1927a.

Lateral trunk flexions. *Gallus*. Féré, C. 1894b.

REGIONAL REFLEXES

Lumbar cord. *Columba*. Baglioni, S. & Matteucci, E. 1909.

Neck. Nishihata, T. 1927a.

Thalamus. *Columba*. Rogers, F. T. & Wheat, S. D. 1921.

Experimental modification of reflexes

General. *Columba* & *Larus*. *Gröbbels, P. 1922c.

Tonus reflexes. Effects of experimental cutting of posterior roots. *Columba*. Trendelenburg, W. E. 1906b.

BEHEADED AND DECEREBRATED BIRDS

General. *Anas*. Tarkhanov, I. R. 1895.

Decerebrated birds. *Columba* & *Gallus*. Schrader, M. E. 1891.

POSTURAL AND MOTOR REFLEXES

General. Nishihata, T. 1927a. *Anas*. Koppányi, T. & Kleitman, N. 1927a, b. *Columba* & *Larus*. Gröbbels, F. 1922c.

Apnea. Produced by pouring water on head and submerging head. *Anas*. Koppányi, T. & Kleitman, N. 1927b.

Effects of electrical stimulation. *Columba*. Gröbbels, F. 1927a.

Lesions of cord and medulla. *Columba*. Gröbbels, F. 1927d.

Operations on labyrinth. *Columba*. Gröbbels, F. 1927c, e.

REMOVAL OF LABYRINTH OF EAR

General. *Columba*. Gröbbels, F. 1926b.

Electrical stimulation. *Columba*. Gröbbels, F. 1927b.

VISUAL REFLEXES

See also under Eye.

General. *Erhard, H. 1924.

In case of coloboma of iris. *Athene*. Reisinger, L. 1926a.

Movements of eyes associated with N. acusticus and thermal stimuli. Includes *Columba*. Kubo, I. 1906.

Transection of optic nerve, effects of. *Columba*. Noll, A. 1922.

Pupillary reflexes

General. Many species. Krohn, A. 1837; Steinach, E. 1890. *Anas*, *Buteo*, *Conurus*, *Loxia*, & *Strix*. Nepveu, A. 1907a, b. *Aquila* & *Bubo*. Sumner, E. L. 1933. *Columba* & *Gallus*. Noll, A. 1925. Includes *Columba*. Brown-Séquard, C. E. 1859. *Larus*. Nepveu, A. 1907a. *Mariposa*. Nepveu, A. 1907b.

Diurnal and nocturnal birds compared. Hess, C. 1908b.

Effects of drugs. Includes birds. Ehrhardt, P. 1890. Includes *Columba* & *Gallus*. Koppányi, T. & Sun, K. H. 1926.

REGENERATION

General. Tur, J. 1901c. *Gallus*. Schaper, A. & Cohen, C. 1905.

Bone marrow after fractures of air-containing bones. *Columba*. Bergmann, E. 1924.

Crop. *Columba* & *Gallus*. Kuriyama, T. 1932.

Embryonic. *Gallus*. Lillie, F. R. 1904a.

Epidermis in wound healing. Includes *Columba* & *Gallus*. Salzer, F. 1915.

Epithelium. *Columba*. Addison, W. H. & Loeb, L. 1913.

Feathers. *Gallus*. Dunn, L. C. & Landauer, W. 1930.

Healing of wounds. *Columba*. Fiedler, J. N. 1824.

Leg in course of six to seven months. *Serinus*. Halfpenny, F. W. 1897.

Ovary in castration experiments. *Gallus*. Benoit, J. 1926e.

Striped muscle fibers. Includes *Coccothraustes*, *Columba*, *Gallus*, *Parus*, *Passer*, *Serinus*, & *Turdus*. Schmincke, A. 1908.

VARIOUS STRUCTURES

Beak

General. *Anas* incidental. Thesing, C. E. 1911. *Ciconiae*. Bordage, E. 1898. *Corvus corax*. Shufeldt, R. W. 1886e. *Falco t. tinnunculus*. Neubaur, R. 1903. *Gallus*. Bordage, E. 1898. Includes *Gallus*. Thesing, C. E. 1911. *Picus*. Wolf, J. 1803.

Horny covering of beak. Larcher, O. E. 1872a.

Regeneration even when beak is amputated near nostrils. Includes bone as well as other tissues. *Anas* & *Anser cinereus*. *Werber, E. I. & Goldschmidt, W. 1909.

Bone

General. *Columba*. Kinel, J. 1910, 1911. Includes *Columba*. Maas, H. 1877. *Gallus*. Kaupp, B. F. 1917. Includes *Gallus*. Maas, H. 1877.

Brain

General. Negative results. Grunert, F. 1894-99.

Cerebral hemispheres. *Columba*. Lefevvre, —. 1909.

Eye

General. *Gallus*. Barfurth, D. & Dragendorff, O. 1902.

Experimental. *Gallus*. Dragendorff, O. 1903.

Nerves

General. *Anas*. Tamura, —. 1922. Motor nerves. *Gallus*. Boeke, J. 1916c.

Axis cylinders (in vitro). *Gallus*. Ingebrigtsen, R. 1913.

Muscle spindles. Includes *Gallus*. Boeke, J. 1916c.

Nerve fibers. In polyneuritis. *Gallus*. *Clark, E. 1914.

Testis

General. *Columba*. Portier, P. 1920.

Effects of castration. *Columba* & *Gallus*. Bond, C. J. 1913.

REGURGITATION

See also under **Habits**.

General. Myers, H. W. 1910.

Cherry stones. Baily, W. L. 1897.

Feeding young by regurgitation. *Wheelock, I. G. 1905. *Bombycilla*. Bergtold, W. H. 1917b; Post, K. C. 1916. *Colaptes*. Brewster, W. 1893.

Lining of gizzard. *Numenius*. Smith, H. H. 1913.

Pellets of bones, feathers, and hair. Bruchlacher, G. 1869; Walter, Adolf 1877c. *Columba palumbus*. Blagg, E. W. 1887.

REPRODUCTION

See also under **Behavior**, **Embryology**, **Endocrinology**, **Habits**, **Poultry culture**, **Sex**, and **Urogenital system**.

Books. Text in English. *Colinus*. *Stoddard, H. L. 1931.

Text in German. Thienemann, F. A. 1845-56; Zimmermann, R. 1922.

General. Detmers, E. 1913; Mousley, W. H. 1917c; Noll-Tobler, H. 1920;

Schuster, L. 1925b, 1926b; Taubert,—. 1878.

Cuculus. Gloger, C. W. 1854g; Rey, J. G. 1872b. *Dromaeus* [*Dromiceius*] *novae-hollandiae*. Le Prestre, F. 1871. *Gallus*. Girou de Buzareingues, C. 1828; Schjelderup-Ebbe, T. 1923c. *Loxia*. McCabe, T. T. & McCabe, E. B. 1933. *Lyrurus*. Christoleit, E. 1926b. *Meleagris*. Girou de Buzareingues, C. 1828. *Melospiza melodia beata*. Nice, M. M. 1932b. *Sturnus*. Grabham, O. 1895.

Breeding in immature plumage. Bureau, L. 1901a. *Loxia*. Macpherson, H. A. 1889a.

Broods, number of, in season. *Emberiza hortulana*. Schuster, L. 1926b.

Early maturity. Female Falcones. Brehm, C. L. 1840c.

Effects of domestication. *Anser* & *Gallus*. *Stieve, H. 1926.

Hybrids. *Carduelis* × *Serinus*. Cookson, G. 1839–40.

Identical twins. Columbidae. Riddle, O. 1918b, 1921a, 1923c.

Interval between broods of double- and triple-brooded species. Fraser, A. C. 1924.

Late broods. Altum, B. 1866b, c, 1867b.

Maximum period between laying and brooding. *Fringilla chloris* & *Carduelis*. Rey, J. G. 1867.

Monogamy. Detmers, E. 1913.

Number of fully developed young. *Buteo vulgaris*. Weibull, V. 1909.

Period of day for greatest sexual activity of male. *Gallus*. Upp, C. W. 1928b.

Polyandry. *Rhea*. Astley, H. D. 1907.

Polygamy. Detmers, E. 1913. *Fringilla*. Jacobi, J. 1864. *Quiscalus* [*Cassidix*]. Chapman, F. M. 1898b. *Sylvia*. Jacobi, J. 1864.

Reproduction in captivity. Jabouille, P. 1927; Page, W. T. 1912, 1914. *Uraeginthus*. Decoux, A. 1914.

Reserve food in egg. Causes and consequences. Loisel, G. 1899a.

Two cuckoos reared in one nest. Le Souëf, W. H. 1907.

Variation in age of young. Strigidae. Schuster, L. 1904.

EXPERIMENTAL REPRODUCTION

Rearing wild species by foster parents. Fringillidae. Scott, W. E. 1904a. *Gallus* by *Asio f. flammeus*. Dubois, A. D. 1923b.

Eggs of one species placed in nest of other species

See also under Behavior: Recognition of.

General. *Progne s. subis*. Jacobs, J. W. 1909. *Tyrannus*. Strong, R. M. 1891b.

Acceptance and rejection. *Swynerton, C. F. 1918b.

GERM CELLS

Book. Text in English. Birds incidental. Hegner, R. W. 1914a.

Chondriosomes. *Gallus*. Tschaschin, S. 1910.

Development. Includes birds. Minot, C. S. 1880a. *Gallus*. *Berenberg-Gossler, H. 1912b; Fell, H. B. 1923; Gatenby, J. B. 1924; Nussbaum, M. 1901b; Reagan, F. P. 1918. Includes *Gallus*. Beccari, N. 1919–20. *Gallus* incidental. Hegner, R. W. 1914b.

Effect of lead. Includes *Gallus*. Cole, L. J. & Bachhuber, L. J. 1914.

PRIMORDIAL GERM CELLS

Anas. Berenberg-Gossler, H. 1912a, 1914; *Rubaschkin, W. 1907. *Gallus*. Berenberg-Gossler, H. 1912a, 1914; Matsumoto, T. 1932; Richards, A. & Goldsmith, J. B. 1927; Richards, A., Hulpieu, H. R., & Goldsmith, J. B. 1926; *Rubaschkin, W. 1907; *Swift, C. H. 1914, 1915, 1916; Tschaschin, S. 1910.

Castration experiments. Origin of sex cords in regeneration. *Gallus*. Benoit, Jacques 1926e.

Continuity of germ cells with primordial germ cells. Study using Golgi bodies. *Gallus*. Woodger, J. H. 1925.

Cytology. *Gallus*. Berenberg-Gossler, H. 1912b, c.

Development. Firket, J. 1913.

Effects of experimental removal. *Gallus*. Willier, B. H. 1926.

Morphological characteristics. Cashin, S. S. 1910.

Significance of the primordial ova. Laulanié, B. P. 1886a.

Stability of germ plasm. Duerden, J. E. 1919c.

Ova (Eggs)

Books. Text in German. Bädeker, F. W. 1863.

Text in Latin. Include *Gallus*. Langly, W. 1674a, b; Harvey, W. 1651; Schrader, J. 1674.

General. Cigna, G. F. 1759; Anon. 1884a. Include birds. Galeb, O. 1878; Jörg, J. C. 1815. *Columba*. Albertus Magnus 1651. *Gallopavo*. Hänfler, J. 1697. *Gallus*. Albertus Magnus 1651; Libavius, A. & Bavarus, T. 1610; Schoock, M. 1643; Strauss, L. 1669; Thomson, Allen 1892; Tur, J. 1903b. Includes *Gallus*. Korschelt, E. 1913. *Tantalus ibis*. Nehr Korn, A. 1876.

Arrangement of eggs and number of eggs in nest. Gibbs, R. M. 1893a.

Destruction by wood ashes. *Gallus*. Svoboda, H. 1902.

Fertile and infertile hybrids, eggs of. Anatidae, *Columba*, & *Serinus*. Poll, H. 1911b.

Fossil eggs. Shufeldt, R. W. 1894b. *Epyornis*. Duvernoy, G. L. 1854.

Genetic potencies. *Anas*, *Cuculus*, & *Gallus*. Seidlitz, G. K. 1868.

Living embryo in egg in abandoned nest. Walter, Adolf 1877b.

Male and female eggs compared in cleavage stages. Serres, P. M. 1856.

Medical use. Struve, E. F. 1766.

Mimicry in eggs. *Cuculus*. Rensch, B. 1924b.

Number of eggs in clutch. Many species. Haviland, M. D. 1923; Serres, P. M. 1840. *Anthus pratensis*. Thomasson, J. P. 1893. *Melopsittacus undulatus*. Tournoux, F. & Tournoux, J. P. 1901.

Sex relation to form of egg. Petit,—. 1900.

Toxicity of parts of egg injected into rabbits and guinea pigs. *Anas* & *Gallus*. Loisel, G. 1905c.

Vigor and vitality of egg. Averill, C. K. 1924; Orr, H. L. 1899.

CHEMICAL AND PHYSICAL STUDIES

General. Jaffa, M. E. 1898.

Loss of weight by evaporation. Bunyard, P. F. 1918.

Osmotic pressure. Atkins, W. R. 1909b. *Anas* & *Anser*. Atkins, W. R. 1909a. *Gallus*. Atkins, W. R. 1909a; Greenlee, A. D. 1912; Rice, F. E. & Young, D. L. 1928. *Meleagris* & *Rhea*. Atkins, W. R. 1909a.

Specific gravity. Drechsler, G. 1896.

Chemical composition

Book. Text in German. Lehmann, C. G. 1850–52.

General. McCue, J. J. 1900; Pennington, M. E. 1909–10; Willard, J. T. & Shaw, R. H. 1909. *Anser*. Segin, A. 1906. *Gallus*. Hugounenq, L. M. & Morel,—. 1905; Kojo, K. 1912; Krukenberg, C. F. 1879; Levene, P. A. 1902; Loebisch, W. F. 1884; Meurs, G. T. 1923; Struve, E. F. 1766.

Arsenic present. Bertrand, G. E. 1903.

Carbohydrates. *Gallus*. Bierry, H., Hazard,—, & Ranc, A. 1912.

Gas content. Dulk, F. P. 1830.

Glucose in albumen. Aldridge,—. 1848–49.

Mineral composition. Include *Gallus*. Bialaszewicz, K. 1926, 1927.

Calcium content

General. *Gallus*. Vaughan, V. C. & Bills, H. V. 1879.

Changes in lime content during development. Plimmer, R. H. & Lowndes, J. 1924.

Enzymes or ferments

General. *Gallus*. Koga, T. 1923. Enzymes. *Gallus*. Pennington, M. E. & Robertson, H. C. 1912.

Ferment resulting from morbid growth. Thomson, W. 1879. *Gallus*. Wohlgemuth, J. 1904, 1905.

COMPARATIVE STUDIES

General. *Gallus*. Koster, W. 1866.

Comparison of avian and mammalian eggs. Courty, A. 1849a.

DEGENERATION

During atresia of ovarian follicles. Birds incidental. Henneguy, L. F. 1893b.

In ovary. Developing bird. *Columba*, *Gallus*, & *Passer*. Dubuisson, H. 1905a.

ENVELOPES

Book. Text in German. Includes birds. pp. 163-172. Ludwig, H. 1874.

General. Giersberg, H. 1921; Loisel, G. 1900e; Ruz de Lavison, E. 1864. Many species. Paris, J. A. 1821.

Acanthis, *Columba*, & *Fringilla*. Retzius, G. 1912b. *Gallus*. Lataste, F. 1924c; Leveillé, J. B. 1799-1800; Mertens, H. 1830; Retzius, G. 1912b.

Development. Baudrimont, A. 1923, 1924; Kaiser, H. 1905; Taschenberg, E. O. 1885, 1894. Includes birds. Ludwig, H. 1874. *Gallus*. Dutrochet, H. 1819a; Landois, H. 1884a, d, e; Lataste, F. 1925b; Pearl, R. & Curtis, M. R. 1912; Rossi, Francesco 1801; Ryder, J. A. 1893.

Structure. Brandes, G. 1892; Carpenter, W. B. 1844. *Gallus*. Dutrochet, H. 1819a.

Albumen

General. Tarkhanov, I. R. 1883a.

Bacteria. *Gallus*. Scholl, H. 1893.

Clearing with sodium or potassium. *Gallus*. Tarkhanov, I. R. 1886.

Changes in coagulability. Includes birds. Davy, J. 1860.

Comparison in altricial and precocial species. Tarkhanov, I. R. 1883a, b.

Development. Giersberg, H. 1921. *Gallus*. Landois, H. 1865; Lataste, F. 1888.

Freezing. *Gallus*. Paget, J. 1850.

Function. *Gallus*. Gasco, F. 1894.

Chemical composition

General. Panormoff, A. A. 1897, 1899. *Gallus*. Heynsius, A. 1875; Langstein, L. 1901; Scholl, H. 1893.

Changes in pH during incubation. *Gallus*. Romanoff, A. L. & Romanoff, A. J. 1929.

Differences. *Gallus*. Tarkhanov, I. R. 1883b.

Effect of carbon dioxide on pH of albumen during incubation. *Gallus*. Romanoff, A. L. & Romanoff, A. J. 1930.

Experimental study. *Gallus*. Poerner, K. W. 1754.

Fibrogenic substance that can transform into a membrane. *Gallus*. Gautier, A. 1902.

Ovomucoid and sugar. Mörner, C. T. 1912.

Relations of

Albumen to yolk and shell in weight. *Gallus*, *Meleagris*, & *Vanellus*. Bauer, R. W. 1895.

Ovum to albumen. *Tarkhanov, I. R. 1883a, b.

Structure including chalaza

General. *Gallus*. Lataste, F. 1925b.

Dry matter in different layers. Romanoff, A. L. 1929b.

Shell

General. Nathusius, W. 1868a. *Aepyornis*, *Apteryx*, & *Crypturiformes*. Nathusius, W. 1871b.

Adaptation of shell structure to respiration. Ogilvie, G. 1867.

Evolution. Nathusius, W. 1879a.

Function in respiration of embryo. *Gallus*. Tangl, F. 1908a.

Hybridization. Effect on form, color, and surface. Pelt Lechner, A. A. 1913.

Inadequate egg shells. Panum, P. L. 1863; Riddle, O. & Behre, E. H. 1921b.

Relation to egg contents in incubation. Tangl, F. 1908a, b.

Changes during incubation

General. *Gallus*. Voit, C. 1877.

Dissolution during incubation. Nowotny, J. F. 1880; Sabel, E. 1880.

Lime content before and after incubation. *Gallus*. Vaughan, V. C. & Bills, H. V. 1879.

Transfer of calcium to embryo. *Gallus*. Buckner, G. D., Martin, J. H., & Peter, A. M. 1925c.

Color

See also under Coloration.

General. König-Warthaussen, R. 1876; Reichenau, W. 1877, 1887.

Effect of feeding soluble calcium salts. Riddle, O. & Hanke, M. C. 1921.

Red stain produced by feeding madder. *Gallus*. Joly, N. 1860.

Viewed with ultraviolet light. Schönwetter, M. 1932.

Pigments

General. Averill, C. K. 1924; Dickie, G. 1849; *Krukenberg, C. F. 1883b; Sorby, H. C. 1875, 1876. Many species. M'Aldowie, A. M. 1886; Nathusius, W. 1882b, 1894a.

Development. Bunyard, P. F. 1927.

Effect of hybridization. *Serinus*. Tschermak, A. 1910, 1912, 1915.

Ooporphyrin. *Fischer, H. & Kogl, F. 1923. *Larus*. Fischer, H. & Lindner, F. 1925.

Structure and texture

General. Baudrimont, A. E. & Saint-Ange, M. 1847; Blasius, R. 1867; Des Murs, M. A. 1843; Dickie, G. 1849; Ebert, G. R. 1869; Gervais, F. L. 1877; Kutter, F. 1877, 1880; Landois, H. 1882f, 1884a, d, e; Nathusius, W. 1868a, 1872, 1883; Wickmann, H. 1889. Many species. Moquin-Tandon, C. H. 1859; Nathusius, W. 1882a, b, 1884. Includes birds. Mayer, A. F. 1865.

Dinornis. Nathusius, W. 1870, 1871b. *Gallus*. Holst, W. F., Almqvist, H. J., & Lorenz, F. W. 1932; Landois, H. 1865; Nathusius, W. 1882b. *Opisthocomus cristatus*. Nathusius, W. 1881. *Rhea*. *Nathusius, W. 1896c. *Struthio*. Nathusius, W. 1885b. *Vulturinae*. *Szielasko, A. E. 1911, 1913. Hybrids of *Corvus corone* × *C. cornix*. Nathusius, W. 1874.

Abrasions. Bunyard, P. F. 1919-20.

Hardness and toughness. *Cuculus*. Walter, Adolf 1885.

Lime bodies. Many species. Nathusius, W. 1887.

Physical properties. *Gallus*. Romanoff, A. L. 1929f.

Polish. Many species. Moquin-Tandon, C. H. 1859.

Relationship between breaking strength and per cent of egg shell. Morgan, C. L. 1932.

Striae on shell. *Aepyornis maximus*. Joly, N. 1868a.

Study with polarized light. *Anser* & *Struthio*. Schmidt, W. J. 1922.

Taxonomic consideration. Nathusius, W. 1878.

Thickness. *Gallus*. Taylor, L. W. & Martin, J. H. 1928. *Rhea*. Nathusius, W. 1896c.

Permeability by

General. *Gallus*. Féré, C. 1901c.

Bacteria. *Gallus*. Sachs-Mucke, —. 1907.

Wood ash components. *Gallus*. Svoboda, H. 1902.

Pores

General. Many species. Moquin-Tandon, C. H. 1859.

Number and distribution. *Gallus*. Rizzo, A. 1899.

Transparency

General. Many species. Moquin-Tandon, C. H. 1859.

Changes with time. Leroy, A. 1924.

Shell membranes

Book. Text in German. *Gallus*. *Haug, R. 1889.

General. Morozzo, C. L. 1802; Nathusius, W. 1868b. Includes birds. Barry, M. 1853. *Anas* & *Columba*. Giacomini, E. 1900. *Gallus*. Giacomini, E. 1900; Nathusius, W. 1893b.

Anomalies. Baudrimont, A. 1923. *Gallus*. Lataste, F. 1922, 1924b.

Development. Baudrimont, A. 1923; Nathusius, W. 1896b. Include birds. Schauinsland, H. H. 1902, 1903a. *Gallus*. Purkinje, J. E. 1825; Weidenfeld, J. 1897. Includes *Gallus*. Lataste, F. 1878.

Evolution. Nathusius, W. 1879a.

Histology. Berthold, A. A. 1830. Include birds. Mayer, A. F. 1865; Nathusius, W. 1872; Schirshoff, D. 1901; Schüller, M. 1899a, b; Szuman, J. G. 1925a, b. Book. Text in German. Gadow, H. F. 1891d.

Three membranes claimed. *Gallus*. Dönhoff, E. 1876b.

Air space

General. Hehl, J. C. 1796. *Gallus*. Bucknell, —. 1839.

Changes with time. Leroy, A. 1924.
Effects of freezing on size. *Gallus*.
Le Roy, G. A. 1917.

Experimental modification of position. *Gallus*. Lataste, F. 1924a.

Physiology

Endosmosis. Gayon, U. 1874; Anon. 1874a.

Properties of filtration. *Gallus*. Thunberg, T. 1902.

Regeneration. Berthold, A. A. 1830.

FORM OR SHAPE

General. Hardy, J. 1857; Nikolsky, A. M. 1899; Wagner, V. A. 1889. *Gallus*. Kopeć, S. 1924; Schenkling-Prévôt, C. 1898a.

Causes of shape. Thompson, D. W. 1908.

Comparison with form of skeleton. La Fresnaye, F. 1845.

Development of form. Mathematical treatment. *Gallus*. Ryder, J. A. 1893.

Mathematical analysis. *Szielasko, A. E. 1902a, b, 1905.

Ratio of major and minor axes. Hoxie, W. 1886c, 1888a.

INCLUSIONS OF ABNORMAL OBJECTS

General. Iwersen, —. 1876. *Anas*. Panum, P. L. 1863. *Gallus*. Beauchamp, P. 1909; Benjamin, E. W. 1914; Collin, A. 1894; Drechsler, G. 1896; Dublancq-Laborde, R. 1912; Koenike, F. 1888; Landois, H. 1882d; Latschenberger, J. 1876; Linstow, O. 1898; Mari, N. N. 1900; Panum, P. L. 1863; Rosnatowsky, J. P. 1927; Schiller-Tietz, N. 1903.

Blood. *Gallus*. Landois, H. 1882d; Mitrophanov, P. I. 1898c.

Bone, cartilage, and connective tissue. *Gallus*. Nathusius, W. 1895.

Corn between envelopes. *Gallus*. Budge, J. 1849.

Pin. Anon. 1838.

"Serpent." Bartholinus, T. 1673; Cleyer, A. 1683a; Paullin, C. F. 1706; Santasofia, J. & Grandi, J. 1757; Schultz, S. 1672.

Starch granules. Dastre, O. 1879.

Stone. Panthot, J. B. 1690; Wedel, G. W. 1680.

Parasites

General. *Gallus*. Drechsler, G. 1896; Henneguy, L. F. 1912; Renault, B. 1900.

Bacteria

Book. Text in French. Artault de Vevey, S. 1898.

General. *Gallus*. Brannon, M. A. 1893; Brüning, A. 1908; Chrétien, A. 1908, 1910, 1911; Daumézou, G. 1913; Gayon, U. 1877; Kossowicz, A. 1916; Lamson, G. H. 1909; McClintock, C. T. 1893; Maurer, O. 1911; Menini, G. 1907; *Poppe, K. 1910; Rettger, L. F. 1914, 1916; Rosenberger, R. C. 1912; Rullmann, W. 1916a, b; Zörkendörfer, —. 1892–93.

Bacteria entering through shell. *Gallus*. Lange, R. 1907.

Freedom from bacteria. Bacteriological study. *Gallus*. Rettger, L. F. 1913.

Microzymas. *Gallus*. Watkins, R. L. 1912.

Salmonella pullorum. *Gallus*. Weaver, H. J. & Weldin, J. C. 1931.

Vibriones

General. *Gallus*. Bonhoff, H. 1895; Grigorjew, A. V. 1894.

Cholera vibriones. *Gallus*. Doenitz, F. C. 1895; Kempner, W. 1894.

Fungi

Book. Text in French. Artault de Vevey, S. 1898.

General. Brtnfk, A. 1916; Brüning, A. 1908; Gunning, W. M. 1855; Harless, E. 1853; Mosler, F. 1864; Wittich, W. 1851. *Gallus*. Nathusius, W. 1896a; Postolka, A. 1916; Weston, W. A., Dillon, R., & Halnan, E. T. 1927. *Struthio*. Panceri, P. 1873.

Developed in interior of egg. *Casuaris*. Eudes-Deslongchamps, J. A. 1865.

Development during incubation. *Gallus*. Dareste, C. 1881, 1882d.

Worms

General. *Gallus*. Landois, H. 1882a, c, d, 1894g; Liebe, K. T. 1887; Schäff, E. A. 1889b; Wright, R. R. 1888.

Nematode parasites. *Gallus*. Carruccio, A. 1887; Ernst, A. 1888; Iwersen, —. 1876; Pavesi, P. 1893a.

Tape worm. *Gallus*. Rajat, H. & Péju, G. 1906.

Trematodes

General. *Gallus*. Bonnet, R. 1883b; Spencer, W. B. 1889. *Distomum ovatum*. Linton, E. 1887.

Pathologic products and ova of *Distoma*. *Gallus*. Lominski, F. 1896.

OOGENESIS

Books. Text in German. Gadow, H. F. 1891d; Seidlitz, G. K. 1869. Includes birds. pp. 163–172. Ludwig, H. 1874.

Text in Latin. Fabricius ab Aquapendente, H. 1621. *Gallus*. Fabricius ab Aquapendente, H. 1688.

General. Bonnet, R. 1883a; Coste, J. J. 1838; Eckert, H. 1861; Lamson, G. H. & Kirkpatrick, W. F. 1918; Laulanié, B. P. 1886a; Nathusius, W. 1868b; Pouchet, H. C. & Beauregard, H. 1877; Ruz de Lavison, E. 1864; Samter, J. 1853; Serres, A. E. 1856; Includes birds. Loyez, M. 1906. Birds incidental. Laulanié, B. P. 1888b; Oellacher, J. 1872a.

Anas. Chomković, G. 1927; Kříženecký, J. & Chomković, G. 1927. Anatidae. Poll, H. 1911c. *Colaeus monedula*. *Stieve, H. 1919b. *Columba*. Barry, M. 1838; *Bartelmez, G. W. 1912; Hoyer, H. 1857; Munson, J. P. 1912. *Fringilla*. Meckel von Hemsbach, J. H. 1851. *Galli*. Poll, H. 1911c. *Gallus*. Barry, M. 1838; Beneden, E. 1870; Benoit, Jacques 1926f; Blumenbach, J. F. 1825; Borsenkow, J. 1869; Brambell, F. W. 1925a; *Brode, M. D. 1928; Cramer, F. 1869; Dantschakoff, W. 1929; Ganfini, C. 1909b; Goette, A. W. 1874; Goldsmith, J. B. 1928; Greenwood, A. W. 1925b; Haller, A. 1770; Hollander, F. 1902, 1903; Hoyer, H. 1857; Hulpieu, H. R. 1925; Klebs, E. 1861, 1863; Korschelt, E. 1913; Landois, H. 1884a; Matsumoto, T. 1932; Meckel von Hemsbach, J. H. 1851; Pearl, R. 1912d; Purkinje, J. E. 1825; Ryder, J. A. 1893; Schäfer, E. A. 1880; Schenkling-Prévôt, C. 1898a; *Sonnenbrodt, —. 1908; Stieve, H. 1914; *Swift, C. H. 1914, 1915, 1916; Treder, L. S. 1808; Tur, J. 1920; Van der Stricht, O. 1902; Woodger, J.

H. 1925. Include *Gallus*. Cadiat, L. O. 1880; Valentin, G. G. 1836. *Muscicapa*. Hollander, F. 1902; Van der Stricht, O. 1902. *Parus*. Hollander, F. 1902; Van der Stricht, O. 1902.

Changes in rate of growth. *Anas*, *Anser*, *Columba*, *Gallus*, *Meleagris*, & *Numida*. Riddle, O. 1916c.

Chemical study. Iljin, M. D. 1929.

Competition among ova. *Gallus*. Aschner, B. 1914.

Early oogenesis. *Gallus*. Somer, E. 1905.

Effects of extract of posterior lobe of hypophysis. Riddle, O. 1921b.

Hybrids. Anatidae, Columbidae, & Fringillidae. Poll, H. 1910. *Gallus*. Poll, H. 1912. Phasianidae. Poll, H. 1910. *Phasianus*. Poll, H. 1912; *Smith, G. & Thomas, R. H. 1913.

Late oogenesis. *Anas* & *Columba*. Rauber, A. A. 1876b. *Gallus*. Dutrochet, H. 1819a; Rauber, A. A. 1876b.

Mitochondria. *Passer*. Van Durme, M. 1907, 1913.

Permeability of ovarian egg-membrane to urotropin. *Gallus*. Riddle, O. 1912b.

Quinine effects. *Streptopelia*. Riddle, O. & Anderson, C. E. 1919.

Sterile birds. *Phasianus*. *Smith, G. & Thomas, R. H. 1913.

Maturation

See also under Embryology.

General. *Columba*. *Van Durme, M. 1914. *Gallus*. Holl, M. 1890; *Van Durme, M. 1914. *Parus*, *Passer*, *Regulus*, & *Turdus*. *Van Durme, M. 1914.

Origin and migrations of gonocytes. *Gallus*. Defretin, R. 1924.

Oocytes and oögonia

Golgi apparatus, in oocyte. Brambell, F. W. 1924a.

Number in ovary. *Gallus*. Pearl, R. 1912c.

Pseudochromosomes. *Gallus*. Hollander, F. 1904.

Vitelline body of Balbiani in oocytes. *Gallus*. Hollander, F. 1902, 1903, 1904; Mertens, H. 1894.

PHYSIOLOGY

Book. Text in French. Vicq d'Azyr, F. 1805.

General. Béchamp, P. J. & Eustache, G. 1877. Many species. Paris, J. A. 1821. *Gallus*. Paris, J. A. 1811.

Coagulation. Dechambre, A. 1880.

Defense against cold, heat, and desiccation. Loisel, G. 1900e.

Electrical condition. Changes in period after laying and during laying. *Gallus*. Davy, J. 1859.

Experimental study. Hehl, J. C. 1796.

Food. Effect on size and proportions of eggs. Many species. Goebel, H. 1903.

Hormone. Effects on formation of hen's egg. Asmundson, V. S. 1931.

Spontaneous production of crystals. *Gallus*. Gayon, U. 1875.

Transmissibility for ions. Many species. Mizutani, K. 1929.

Factors influencing size, shape, and physical constitution

General. Wagner, V. A. 1889. *Gallus*. *Curtis, M. R. 1914a.

Effect of food and temperature on size and proportions. Many species. Goebel, H. 1903.

Polarity of egg

General. *Columba*. *Bartelmez, G. W. 1912, 1918. *Corvus*. Nathusius, W. 1894b. *Gallus*. Dalton, J. C. 1881; Féré, C. 1900b; Kopsch, F. 1902, 1927; Nathusius, W. 1885a, c; Patterson, J. T. 1910, 1911; *Peebles, F. 1904; Wickmann, H. 1896. *Lanius*. Nathusius, W. 1894b.

In blastodisc. Duval, M. M. 1885c.

In oviduct. *Corvus* & *Lanius*. Nathusius, W. 1894b.

In uterus and during laying. Olsen, M. W. & Byerly, T. C. 1932.

Resistance to excessive humidity

General. *Anas*, *Gallus*, & *Podiceps*. Loisel, G. 1900h.

Effects on incubating eggs lying in water. About 30% hatched. *Gallus*. Lippincott, W. A. & De Puy, P. L. 1923.

Resistance to variations in temperature

General. *Gallus*. Salvioli, I. 1899.

Freezing. Fertility of eggs not destroyed by temperature below 5°+. Davy, J. 1864a.

PUTREFACTION

See also under Inclusions of abnormal objects.

General. Drechsler, G. 1896; Thomson, W. 1874.

Bacteria of very old eggs eaten by Chinese. Dold, H. & Li, M. 1916.

Experimental putrefaction. *Gallus*. Donné, A. 1863.

Intact shell. *Gallus*. Dareste, C. 1864a.

When is egg fresh? Rennes, M. 1926.

SIZE

See also under Quantitative works.

General. Hoxie, W. 1887b, 1890a, b; Meyer, G. R. 1916. *Gallus*. Kopeč, S. 1924.

Climatic effects. *Anas*, *Columba*, *Gallus*, & *Haliaeetus*. Hesse, R. 1923.

High and low temperature, effects of. *Gallus*. Bennion, N. L. & Warren, D. C. 1933b.

Length of day, effects of. *Anas*, *Columba*, *Gallus*, & *Haliaeetus*. Hesse, R. 1923.

Relation to body size. Freund, L. 1923.

Relation to species parasitized. *Cuculus*. Rey, J. G. 1871.

Significance. Many species. Reichenow, A. 1870.

Variation. *Cuculus*. Latter, O. H. 1902b.

STERILE OR UNFERTILIZED EGGS

Changes. *Gallus*. Oellacher, J. 1870, 1872b.

Degeneration of unfertilized egg. *Gallus*. Lecaillon, A. 1910a.

Effect of magnetism. Maggiorani, C. 1884.

Experimental study. *Gallus*. Stewart, J. H. & Atwood, H. 1900a.

Resistance to desiccation. Dubois, R. 1885.

Structure. *Turtur*. Maia, M. 1877.

STRUCTURE AND CHARACTERISTICS

Books. Text in English. Hunter, John 1861; Rennie, J. 1831. Good figures. *Gallus*. Carpenter, W. B. 1846.

Text in French. Vicq d'Azyr, F. 1805. *Gallus*. Haller, A. 1758.

Text in German. Gadow, H. F. 1891d; Seidlitz, G. K. 1869.

Text in Latin. *Gallus*. Fabricius ab Aquapendente, H. 1621, 1688.

General. Amar, J. 1924; Bartholinus, E. 1671-72; Bonnet, R. 1883a; Drechsler, G. 1896; Dutrochet, H. 1819a; Gasser, E. 1884; Hann, O. 1875; Klebs, E. 1864; McCue, J. J. 1900; Rutz de Lavison, E. 1864; Szielasko, A. E. 1902a. Include birds. Barry, M. 1853; Gegenbaur, C. 1861. *Anser*. Towne, J. 1839. *Gallus*. Balbiani, E. G. 1878; Beneden, E. 1870; Davy, J. 1864b; Gegenbaur, C. 1864b; Hasterlik, A. 1916; Hunter, A. 1803; Leveillé, J. B. 1800; Müller, C. 1896; Schenkling-Prévôt, C. 1898a; Schjelderup-Ebbe, T. 1923c; Steno, D. N. 1673c; Struve, E. F. 1766; Tod, D. 1846; Towne, J. 1839.

Popular account. Neumann, C. 1899.

Taxonomic consideration. Many species. Nathusius, W. 1871a.

Germinal disc

General. Minot, C. S. 1883a. *Gallus*. *Smiechowski, A. V. 1893.

Comparison in fertilized and unfertilized eggs. *Anas*. Chappellier, A. 1912a. *Gallus*. Dareste, C. 1864e.

Duration of vitality. Calasanti, G. 1878.

Changes in unfertilized egg after laying

General. *Gallus*. Lecaillon, A. 1908a, b.

Degeneration in unfertilized egg. Lecaillon, A. 1909b, 1910b.

Structure

General. *Gallus*. Durante, F. 1873. Attraction sphere. Mertens, H. 1893, 1894.

Chalaza. Structure and function. Berthold, A. A. 1829b.

Golgi reticular apparatus. *Gallus*. Ikeda, Tamotsu 1928.

Megaspheres. *Gallus*. *Smiechowski, A. V. 1892, 1893.

Sperm nuclei. *Gallus*. Patterson, J. T. 1910.

Nucleus of Balbiani (yolk nucleus) and cytoplasmic structure

General. Include birds. Loyez, M. 1907; Schütz, J. 1882. Birds incidental. Eimer, G. H. 1872. *Charadrius* & *Coccothraustes*. Loyez, M. 1903a. *Columba*. Munson, J. P. 1912. *Emberiza*. Loyez, M. 1903a. *Gallus*. Hollander, F. 1902, 1903, 1904; Kossel, A. 1885; Legge, F. 1886; Loyez, M. 1903a; Miescher, F. 1871. Include *Gallus*. Henneguy, L. F. 1892, 1893a. *Haematopus*. Loyez, M. 1903a. *Muscicapa*. Hollander, F. 1902. *Parus*. Hollander, F. 1902; Loyez, M. 1903a. *Pica*. Loyez, M. 1903a.

Karyosomes. *Passer*. Harper, E. H. 1912.

Pseudochromosomes. Filaments in this body. *Gallus*. Hollander, F. 1902, 1904. *Muscicapa* & *Parus*. Hollander, F. 1902.

Temperature of egg

Higher than surrounding medium. Nonincubating egg. *Gallus*. Murray, J. 1826.

Relation to its physiology. Difference in temperature of large and small ends of egg. *Gallus*. Murray, J. 1826.

Weight changes during incubation

General. Prévost, J. L. & Dumas, J. B. 1825.

Decrease in weight. Norton, E. S. 1909.

Loss

General. *Gallus*. Pott, R. 1877; Stewart, J. H. & Atwood, H. 1901.

Rate. *Gallus*. Dunn, L. C. 1922d, 1923g.

YOLK

General. Tarkhanov, I. R. 1883c. Includes *Passer*. *Dubuisson, H. 1906.

Absorption. See also under Embryology. Ryder, J. A. 1889.

Changes in pH during incubation. *Gallus*. Romanoff, A. L. & Romanoff, A. J. 1929.

Megaspheres. Function and development. *Gallus*. Smiechowski, A. V. 1893.

Position. *Gallus*. Atwood, H. & Weakley, C. H. 1917.

Relations. *Tarkhanov, I. R. 1883a, b, c.

Resorption. *Gallus*. Dubuisson, H. 1904.

Size. Effect of alcohol. Columbidae. Riddle, O. & Basset, G. C. 1916.

Vitelline body. Mertens, H. 1894.

Chemical composition

General. Gobley, —. 1846; Malcolm, J. 1901; Parke, J. L. 1867.

Amyloid substance. Dareste, C. 1866c, 1868a, 1877a; Lubach, D. 1868.

Iron. *Gallus*. Wassermann, F. 1910.

Lipoids present. *Gallus*. Serono, C. & Palozzi, A. 1911.

Low temperatures, effect of. *Gallus*. Moran, T. 1925.

Peptic enzyme in yolk. *Gallus*. Krukenberg, C. F. 1879.

Peptone content during incubation. *Gallus*. Fischel, W. 1886.

Phosphatides in yolk. Stern, M. & Thierfelder, H. 1907.

Physical chemistry of yolk. *Gallus*. Virchow, H. J. 1888.

White and yellow egg yolk compared. *Columba* & *Gallus*. Spohn, A. A. & Riddle, O. 1916.

Color

General. *Gallus*. Dryden, J. 1905.

Coloring matter of yolk. Barbieri, N. A. 1912. *Gallus*. Mattikow, M. 1932.

Spectral characteristics. Lewin, L., Miethe, A., & Stenger, E. 1908.

Effects of food

General. Des Murs, M. A. 1843. *Gallus*. Henderson, E. W. & Wilcke, H. L. 1933; Waite, R. H. 1911a.

Experimental feeding. *Gallus*. Clayton, M. G. 1925.

Pimiento pepper, in food. *Gallus*. Brown, W. L. 1930.

Sudan III in food. Riddle, O. 1910.

Development

General. Hubrecht, A. A. 1912; Ikeda, Tamotsu 1928; Riddle, O. 1911. Birds incidental. Ryder, J. A. 1889. *Anas*. Chomković, G. & Kříženecký, J. 1928–29; Kříženecký, J. & Chomković, G. 1927. *Passer*. Dubuisson, H. 1905b.

Abnormal yolk formation. Extra-ovular and extra-follicular. *Gallus*. *Riddle, O. 1912a.

Role of mitochondria. *Columba*, *Gallus*, *Parus*, *Regulus*, & *Turdus*. *Van Durme, M. 1913.

Vitelline membrane

General. Gross, A. 1899; Pouchet, F. A. 1839. *Gallus*. Frommann, C. F. 1879, 1880b. Includes *Gallus*. Lataste, F. 1878. *Turdus*. Lecaillon, A. 1910j. *Turdus merula*. Lecaillon, A. 1910f, i.

Development. *Gallus*. Mitrophanov, P. I. 1898c, d; Stricker, S. 1866.

Histology. *Gallus*. Mitrophanov, P. I. 1898c, d.

Spermatozoa

Book. Text in Latin. Fabricius ab Aquapendente, H. 1688. Includes *Gallus*. p. 162. Leeuwenhoek, A. 1687.

General. Many species. *Retzius, G. 1909. Includes birds. Burnett, W. I. 1853b.

Anas. Berenberg-Gossler, H. 1912b; Popoff, N. 1909. Includes Anatinae. Philpitschenko, J. A. 1917. *Colaeus monedula*. Retzius, G. 1911b. *Columba*. Popoff, N. 1909; Retzius, G. 1911b. Includes *Columba*. Philpitschenko, J. A. 1917. Includes Corvidae. Retzius, G. 1912a. *Corvus*. Popoff, N. 1909. *Cypselus apus*. Retzius, G. 1911b. *Gallus*. Berenberg-Gossler, H. 1912b; Popoff, N. 1909. Includes *Gallus*. Schweigger-Seidel, F. 1865. *Lanius collurio*. Retzius, G. 1911b. *Passer*. Alverdes, K. 1924. Includes *Passer*. Popoff, N. 1909. Includes *Struthio*. Retzius, G. 1911a. *Uria*. Ballowitz, E. 1913.

Activity, number, and volume in successive ejaculations. *Gallus*. Amantea, G. 1922, 1925.

Competitive action in fertilization. *Gallus*. Crew, F. A. 1927c.

Culture *in vitro*. Landrieu, L. 1912.

Cytology. Ballowitz, E. 1886, 1888. Include birds. Jensen, O. S. 1886a, b; Waldeyer-Hartz, W. 1887. *Columba* & *Gallus*. Eimer, G. H. 1874. Includes *Gallus*. Gibbes, H. 1880. *Passer*. Eimer, G. H. 1874.

Relation of stale sperm to fertility and sex. *Streptopelia*. Riddle, O. & Behre, E. H. 1921a.

Resemblance of spermatozoa of Meliophagidae to spirochaete trypanosomes. Cleland, J. B. & Johnston, T. H. 1909.

Susceptibility to nuclease. Includes *Gallus*. Herwerden, M. A. 1916.

Transformation in tissue culture. *Gallus*. Loeb, J. & Bancroft, F. W. 1912.

Vitality. *Gallus*. Ivanov, E. J. 1924b; Lau, H. 1894; Laurie, D. F. 1919.

FERTILIZING POWER

Dependent upon efficiency of spermatozoa rather than quantity. *Gallus*. Hutt, F. B. 1929b.

Varies with age of sperm. *Anas* & *Gallus*. Chappellier, A. 1915, 1917.

MOVEMENTS

General. *Columba*, *Gallus*, & *Passer*. Eimer, G. H. 1874.

Motility. *Gallus*. Amantea, G. 1922, 1925; Ivanov, E. J. 1924b.

Speed of travel in oviduct. *Gallus*. Payne, L. F. 1914.

Swimming against current. Adolphi, H. 1906.

SPERMATOGENESIS

General. Benoit, J. 1926g; Brunn, F. A. 1884; Bugnion, E. & Popoff, N. 1906; Burnett, W. I. 1853b; Greenwood, A. W. 1925b; Stephan, P. 1903b; van Oordt, G. J. 1928. Include birds. Balbiani, E. G. 1877; Waldeyer-Hartz, W. 1887.

Anas. Helman, C. 1879. Anatidae. Poll, H. 1911b; *Schöneberg, K. 1913. Includes *Anser*. Stieve, H. 1927a. *Arenaria* & *Calidris*. van Oordt, G. J. 1928. *Chloris c. chloris*. Sanfelice, F. 1889b. *Columba*. Moore, J. E. 1895. Columbidae. Guyer, M. F. 1903; *Poll, H. 1910. *Corvus*. Orban, F. 1923, 1928, 1929. Fringillidae. *Poll, H. 1910. Galli. Poll, H. 1911a. *Gallus*. *Bor-

ing, A. M. & Pearl, R. 1914; Cavalié, M. 1900; Dantschakoff, W. 1929; Goldsmith, J. B. 1928; *Guyer, M. F. 1916; Hulpieu, H. R. 1925; Laulanié, B. P. 1886c; Mazzetti, L. 1911; Sanfelice, F. 1889b; Stephan, P. 1903c; *Swift, C. H. 1914, 1915, 1916; Woodger, J. H. 1925. Include *Gallus*. Helman, C. 1879; Schweigger-Seidel, F. 1865. *Gallus bankiva* & *Ligurinus chloris*. Sanfelice, F. 1888. *Numida*. Guyer, M. F. 1909d. *Passer*. Loisel, G. 1899b, c, 1900b, c, 1901a, b, c, 1902a; Regaud, C. 1902b. Includes *Passer*. Bugnion, E. 1908. *Passer italiae*. Sanfelice, F. 1888. *Sturnus*. *Bissonnette, T. H. 1930a, b, 1931a, b. *Tringa canutus*. van Oordt, G. J. 1928.

Hybrids. Anatidae. Poll, H. 1908b, 1910, 1911a; Stephan, P. 1908. *Carduelis* × *Serinus*. Stephan, P. 1903d. Columbidae. Guyer, M. F. 1900, 1903; Stephan, P. 1903b. *Gallus*. Poll, H. 1912. Phasianidae. Poll, H. 1908b, 1910. *Phasianus*. Poll, H. 1912; *Smith, G. & Thomas, R. H. 1913; Stephan, P. 1903d. *Pyrrhula* × *Carduelis*. Stephan, P. 1903a. *Streptopelia*. Stephan, P. 1903d.

Development and function of seminiferous epithelium. *Passer*. Loisel, G. 1902b.

Effect of food. *Gallus*. Craft, W. A., M'Elroy, C. H., & Penquite, R. 1926.

Function of nucleus in amitosis. Loisel, G. 1900g.

Giant spermatozoa in hybrids. Columbidae. *Smith, G. 1912.

In inanition. *Columba*. Grandis, V. 1889.

Mitochondria. *Anas* & *Gallus*. Berenberg-Gossler, H. 1912b.

Relationship to migrations. *Calidris arenaria*. Patten, C. J. 1911b.

Seasonal changes. Böker, H. 1923a. Includes *Anser*, *Colaeus*, & *Fringilla*. Oslund, R. 1928.

Spermatogenetic wave. *Passer*. Foley, J. O. 1928.

Sterile birds. *Phasianus*. *Smith, G. & Thomas, R. H. 1913.

Use of Weigert method. *Passer*. Loisel, G. 1903c.

Experimental studies

General. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1926c.

Effects of colored light. *Sturnus vulgaris*. Bissonnette, T. H. 1932; Bissonnette, T. H. & Wadlund, A. P. 1931.

Effects of light increase. *Sturnus vulgaris*. Bissonnette, H. & Wadlund, A. P. 1931.

Sertoli cells

Origin. *Passer*. Loisel, G. 1901b, c, e.

Role. Loisel, G. 1901b, c, e. *Passer*. Regaud, C. 1902b.

VIABILITY OF SPERMATOZOA

General. Rolf, A. F. 1916. *Gallus*. Ivanov, E. J. 1924b; Lau, H. 1894; Laurie, D. F. 1919.

Longevity after fecundation. *Anas* & *Gallus*. Chappellier, A. 1915, 1917.

Period of viability in oviduct

General. Jameson, —. 1821; Jarvis, L. G. 1898. *Gallus*. Warren, D. C. & Kilpatrick, L. 1929.

Experiments with male removed from female. *Gallus*. Gray, D. T. 1916; Kaupp, B. F. 1919b.

PHYSIOLOGY OF REPRODUCTION

Books. Text in German. Ludwig, H. 1874. *Gallus*. Durski, S. P. 1907.

Text in Latin. Willughby, F. 1676.

General. Giersberg, H. 1921; Hardy, J. 1857; Kaiser, H. 1905; Kutter, O. F. 1880; Mensa, A. 1921; Moquin-Tandon, C. H. 1859; Pearl, R. 1909; Riddle, O. 1916d; Ruzf de Lavison, E. 1864; Tarkhanov, I. R. 1883c; Tegetmeier, W. B. 1894; Wickmann, H. 1889. Many species. Nathusius, W. 1884.

Columba. Barry, M. 1838; Hankó, B. 1910. *Columbidae*. Riddle, O. 1928b. *Corvus*. Nathusius, W. 1894b; *Wickmann, H. 1896. *Fringilla*. *Wickmann, H. 1896. *Gallus*. Barry, M. 1838; Froböse, H. 1928; Geoffroy St. Hilaire, E. 1822f; Hargitt, C. W. 1899; Hicks, J. S. 1881; Ivanov, E. J. 1924b; Landois, H. 1884a, d, e, 1894a; Lapeyronie, F. G. 1732; Lataste, F. 1889, 1924b, c, 1925a, b; Ledel, S. 1683; Nathusius, W. 1885a, 1893b; Novak,

J. & Duschak, F. 1923; Ohler, K. W. 1899b; Panthot, J. B. 1690; Panum, P. L. 1863; Parker, G. H. 1906; Patterson, J. T. 1910, 1911; *Pearl, R. 1909, 1911g; Purkinje, J. E. 1825; *Racah, M. 1922; Schenkling-Prévôt, C. 1898a; *Tauber, P. 1875; Turchini, J. 1924; Weidenfeld, J. 1897; *Wickmann, H. 1896. Includes *Gallus*. Martin Saint-Ange, G. J. 1856. *Garrulus*. *Wickmann, H. 1896. *Lanius*. Nathusius, W. 1894b. *Plectolophus* & *Upupa*. *Wickmann, H. 1896.

Acceleration of breeding period by exposure to artificial light in winter. Rowan, W. 1928, 1929, 1930. *Erithacus rubicula*. Putzig, P. 1937. *Sturnus vulgaris*. Bissonnette, T. H. 1930a, 1931a, b, 1932.

Artificial insemination. *Gallus*. Rolf, A. F. 1916.

Basal metabolism a factor. *Streptopelia*. Riddle, O., Smith, G. C., & Benedict, F. G. 1933.

Changes in blood calcium. *Streptopelia*. Riddle, O. & Reinhardt, W. H. 1926.

Cholesteremia. Effects on reproduction. *Anas* & *Gallus*. Parhon, C. J. & Parhon, M. 1923.

Effect of daylight on size of clutch. Many species. Haviland, M. D. 1923.

Feeding soluble calcium salts. Effects. Riddle, O. & Hanke, M. C. 1921.

Increase in egg production due to increase in light absorption. Bissonnette, T. H. 1933.

Incubation spots. Local regions of congestion of superficial blood vessels in abdominal region in brooding birds. Bird, M. C. 1907.

Influence of male upon the last brood. Petermann, C. 1878.

Insulin. Effects. Riddle, O. 1923d.

Length of day. Effects. *Anas*, *Columba*, *Gallus*, & *Haliaeetus*. Hesse, R. 1923.

Light periodicity, relations to. *Zenaidura*. Cole, L. J. 1933.

Metabolic rate, significance of. *Columba* & *Streptopelia*. *Riddle, O. 1923c.

Oviposition. Paddock, G. H. 1904.

Pituitary body extract. Failure to activate resting ovary. *Gallus*. Pearl, R. & Surface, F. M. 1915.

Rate of growth changes in oogenesis. *Anas*, *Anser*, *Columba*, *Gallus*, *Meleagris*, & *Numida*. Riddle, O. 1916c.

Red dye (Sudan III fed to mother and transmitted through egg to offspring). *Gallus*. Gage, S. H. & Gage, S. P. 1908.

Relations to carotinoid pigments. *Gallus*. Palmer, L. S. 1919; Palmer, L. S. & Kempster, H. L. 1919b, c.

Singing. Correlation significance. Böker, H. 1923b.

Temperature factor. *Streptopelia*. Riddle, O., Smith, G. C., & Benedict, F. G. 1933.

Thymus gland production of hormone (thymovitin) acting on oviducal glands. *Columba* & *Streptopelia*. Riddle, O. 1924d.

Transfer of calcium from egg shell to embryo. *Gallus*. Buckner, G. D., Martin, J. H., & Peter, A. M. 1925c.

Winter rainfall. Effects. Zedlitz, O. 1908.

Abnormal egg production

See also under Teratology.

General. Condorelli Francaviglia, M. 1923; Iwersen, —. 1876. *Gallus*. Tolmer, L. 1928.

Antiperistalsis. Hiden, R. B. 1921.

Asphyxial death of embryos in eggs abnormally retained in oviduct. Riddle, O. 1923e.

Double-yolked eggs. *Gallus*. *Glaser, O. 1913.

Dwarf eggs. *Gallus*. Pearl, R. & Curtis, M. R. 1916a, b.

Egg in egg. *Gallus*. Henneguy, L. F. 1912; Supino, F. 1897.

ECTOPIA (EGGS IN ABDOMINAL CAVITY)

General. *Gallus*. Eckstein, K. 1889b; Landois, H. 1894e.

Fate of eggs in abdominal cavity. *Gallus*. Pearl, R. & Curtis, M. R. 1914.

Soft-shelled eggs. *Gallus*. Landois, H. 1899, 1903b.

Copulation

General. Eckstein, K. 1889a. Many species. Gerhardt, U. 1914. *Anas*

boschas. Schjelderup-Ebbe, T. 1922e. *Gallus*. Schjelderup-Ebbe, T. 1931. *Micropus a. apus*. Laubmann, A. 1916. Book. Text in Latin. *Gallus*. Langly, W. 1674a.

Erection. *Anas*. Müller, R. 1908.

In flight. Roué, W. B. 1898.

Records of number of copulations per day for females. *Gallus*. Upp, C. W. 1928b.

Fecundity

See also under Fecundity and Poultry culture: Egg production.

General. *Gallus*. Pearl, R. & Schoppe, W. F. 1921.

Influence of age. Pearl, R. 1917f.

Relationship to brooding instinct. *Gallus*. Pearl, R. 1914c.

Fertility of eggs

Book. Text in French. Buffon, G. L. 1770–86.

General. *Gallus*. Curtis, V. & Lambert, W. V. 1929.

Age and vigor of male compared. *Gallus*. Anon. 1902a.

Carnivorous diet. Effects. *Gallus*. Houssay, F. 1907.

Factors. Lamson, G. H. & Card, L. E. 1920.

Increase. *Gallus*. Sclater, P. L. 1909a.

Maintenance of fertility during long sea voyages. Morgan, E. 1927.

Preferences of male as a cause for low fertility. *Gallus*. Upp, C. W. 1928b.

Time required for eggs to become fertile after male has been added to breeding pen. *Gallus*. Waite, R. H. 1911d; Anon. 1909a.

AGE WHEN FERTILITY IS ATTAINED

General. *Gallus*. Crew, F. A. 1927c.

Age for male to be fertile. La Rochefoucauld, P. 1911a.

PERIOD AFTER COPULATION WHEN FERTILE EGGS ARE LAID

General. *Gallus*. Coste, J. J. 1850b; Crew, F. A. 1927c; Lienhart, R. 1922;

Martin, J. H. & Anderson, W. S. 1918; Waite, R. H. 1911c.

Female raising not only first brood but second brood without mate. Eckardt, W. R. 1919a.

Fertile egg one month from copulation. *Gallus*. Wissel,—. 1920.

Hens mated once only laid fertilized eggs from third day for seven to twenty days. Kusakari, T. 1927.

Hatching

General. Steinmetz, H. 1932. *Fulica atra*. Steinmetz, H. 1930. *Gallus*. Baraldi, G. 1896; Dareste, C. 1885a; Horner, F. R. 1853; Tod, D. 1846, 1848; Yarrell, W. 1826. Includes *Gallus*. Pohlman, A. G. 1912. *Larus*. Kirkman, F. B. 1931. *Struthio*. Suquet, N. 1861.

After lesions of shell. Gerlach, L. 1885.

Exclusion of yolk sac. Spampani, G. 1902. *Molacilla*, *Passer*, & *Pratincola*. Spampani, G. 1905.

Function of M. complexus, which is hypertrophied at this time. Keibel, F. 1912, 1914. *Gallus*. Pohlman, A. G. 1919b.

Malposition. Head in small end of egg. *Gallus*. Byerly, T. C. & Olsen, M. W. 1933.

Movements in hatching. Anson, B. J. 1929. *Streptopelia*. Craig, W. 1912a.

Hormone, effects of

General. Columbidae. Riddle, O. 1929.

Gonad extracts. Experimental. *Gallus*. Hogben, L. T. 1924.

Laying of eggs

General. Erdmann,—. 1886; Pad-dock, G. H. 1904. *Cuculus*. Ephraim, O. 1908. *Gallus*. Patterson, J. T. 1910. *Struthio*. Rivière, C. 1911.

Assistance to hen having trouble in laying. Laid two normal eggs in ten minutes. *Gallus*. Crichton, A. 1873.

End of egg which issues first from cloaca. Rey, J. G. 1909b.

Male stimulating female to lay without copulation. Columbidae. *Craig, W. 1911, 1913c.

Oviduct, physiology of

General. Blumenbach, J. F. 1825; Curtis, M. R. 1915b; Kunstler, J. 1907a.

Anas & *Anser*. Wahlgren, F. 1871. Include *Corvus*. Giersberg, H. 1922, 1923. *Gallus*. Baudouin, M. 1913; Giacomini, E. 1900; Gruvel, A. 1901, 1902; *Pearl, R. & Curtis, M. R. 1912; Schumacher, S. 1896; Wahlgren, F. 1871. Include *Gallus*. Giersberg, H. 1922, 1923.

Degeneration of unlaidd eggs. Many species. Brunn, F. A. 1882.

Ligation, section, or removal of oviduct. Effects. *Gallus*. Pearl, R. & Curtis, M. R. 1914.

Movements of egg in oviduct. Landois, H. 1877b.

Nerve stimuli. Effects. *Streptopelia*. Riddle, O. & King, C. V. 1921.

Passage of egg into oviduct. Hann, O. 1877b.

Position of egg in oviduct. Nathusius, W. 1885a, c. *Corvus*, *Fringilla*, *Gallus*, *Garrulus*, *Plicolophus*, & *Upupa*. *Wickmann, H. 1896.

Relation of involution of oviduct to formation of new egg yolk. Chomković, G. & Kříženecký, J. 1928-29.

Retention of eggs. Hoxie, W. 1888b; Le Souëf, W. H. 1910.

Shape of eggs. Thompson, D. W. 1908.

Two eggs in oviduct in different stages. *Gallus*. Nathusius, W. 1892.

SECRETORY ACTIVITY

General. *Gallus*. Pearl, R. 1911f.

Function of Golgi apparatus in oviducal gland cells. *Gallus*. Brambell, F. W. 1925b.

Secretion of albumen by oviducal glands. *Columba*. Riddle, O. & Spohn, A. A. 1916.

Development of egg shell

General. Bau, A. 1908b; *Blasius, R. 1867; Dickie, G. 1849; Harting, P. 1873; Landois, H. 1882f, 1884e; Nathusius, W. 1883, 1896b; Vauquelin, L. N. 1799; Wickmann, H. 1889. Birds incidental. Ryder, J. A. 1889. *Gallus*. Des Murs, M. A. 1861; Froböse, H.

1928; Landois, H. 1865; Nathusius, W. 1893b; Weidenfeld, J. 1897. Includes *Gallus*. Nathusius, W. 1898.

Experimental shell production. Harting, P. 1873.

Shell secretory glands. Relation to physical properties of egg shell. *Gallus*. Romanoff, A. L. 1929f.

Stimulus for shell formation. *Gallus*. Pearl, R. & Surface, F. M. 1909f.

Calcium in egg-shell formation

General. *Gallus*. Buckner, G. D., Martin, J. H., Pierce, W. C., & Peter, A. M. 1922.

Relative utilization of different calcium compounds. *Gallus*. Buckner, G. D., Martin, J. H., & Peter, A. M. 1928.

Sources of lime. Gloeden, B. 1876a.

Development of color of shell

General. Giersberg, H. 1921.

Development of pigmentation. Bau, A. 1908b; Bunyard, P. F. 1927.

Effect of absence of shell gland and vagina. *Gallus*. Curtis, M. R. 1915c.

Ovulation

Effects of cold weather. Columbidae. Riddle, O. & Honeywell, H. E. 1924.

Metabolic change. Columbidae. Riddle, O. 1927c.

Rate. *Gallus*. Brody, S. 1921b.

Relationship to pressure from yolk formation. *Gallus*. Pearl, R. & Curtis, M. R. 1914.

Simultaneous ovulation. Relationship to production of double-yolked eggs. Curtis, M. R. 1915b.

BLOOD SUGAR

Increased blood sugar. Columbidae. Riddle, O. & Honeywell, H. E. 1923b.

Various conditions. Columbidae. Riddle, O. & Honeywell, H. E. 1924.

HORMONE, EFFECTS OF

Corpus luteum. *Gallus*. Pearl, R. & Surface, F. M. 1914b.

Inhibition of ovulation after injection of anterior lobe of hypophysis. *Gallus*. Walker, A. T. 1925.

Suprarenal gland activity. *Columba*. Riddle, O. 1922, 1923f.

Rhythm of reproduction

General. *Gallus*. Goodale, H. D. 1915b.

Effects of external conditions. Zawadowsky, M. M. 1926e.

PERIODISM

Cycles or periods of egg-laying. North American birds. *Burns, F. L. 1915b. *Gallus*. Harland, S. C. 1927.

Experimental modification. *Rowan, W. 1928, 1929, 1932, 1933. Book. Text in English. *Rowan, W. 1931.

Relation to migration. Rowan, W. 1926b, 1927a.

Variation in reproductive cycle. Effects on body size. Riddle, O. & Braucher, P. F. 1934.

Seasonal changes in

Gonads. Benoit, Jacques 1922. *Anas*. Chappellier, A. 1912b.

Voice. Böker, H. 1923a.

Sterility

Cytological basis in germ cells. *Phasianus*. Smith, G. & Thomas, R. H. 1913.

Failure to breed. Unmated birds. *Sturnus vulgaris*. Tischler, F. 1908.

Male copulatory organ small or absent. *Gallus*. Dove, W. F. 1928.

Mating but having no eggs. *Columba*. Schacht, H. 1876; Schulz, R. 1876. *Hirundo*. Schacht, H. 1876.

Somatic and genetic sterility. *Gallus*. Curtis, M. R. & Pearl, R. 1915.

CAUSES

Agglutination of sperms. *Gallus*. *Stieve, H. 1927b.

Experimental cortical lesions. *Gallus*. *Ceni, C. 1907.

Variation in

Activity and production of spermatozoa by male. *Gallus*. Penquite, R., Craft, W. A., & Thompson, R. B. 1930.

Blood fat and phosphorus in the sexes. Riddle, O. & Burns, F. H. 1927.

Chemical composition of reproductive tissues in relation to activity. Riddle, O. & Lawrence, J. V. 1916.

Variations in reproductive cycle. Effects on body size. Riddle, O. & Braucher, P. F. 1934.

Vigor

General. Grote, G. A. 1909.

Age of parents to vigor of offspring. *Gallus*. Atwood, H. 1909.

RESPIRATION

See also under **Biochemistry, Embryology, and Physiology**. For organs of respiration, see under **Respiratory organs**.

Books. Text in French. Campana, A. 1875; Longet, F. A. 1861. *Anas*. Bert, P. 1870.

Text in Latin. Chernak, L. 1773. Birds. p. 32. Swammerdam, J. 1738.

General. Baer, M. 1896a, b; Camper, P. 1773; Fatio, V. 1867; Hertwig, R. 1903; Jacquemin, E. 1835b; Murray, I. D. 1908; Philomatinisky, —. 1833. Many species. Schenkling-Prévôt, C. 1898a; Serres, A. E. 1846; Weber, E. F. 1842. Include birds. Brüning, C. 1916; Reimar, J. A. 1812. Diving birds. Blyth, E. 1837b. Swimming birds. *Bohr, C. 1897.

Anas. *Soum, J. M. 1896b. *Anser*. Bourgeois, N. 1896. Includes *Ciconia*. *Siefert, E. 1896. *Columba*. *Brandes, G. 1923, 1924a, b; *Grober, J. A. 1899; *Soum, J. M. 1896b; Strasser, H. 1905. Include *Columba*. Barry, M. 1827; Dulong, P. L. 1841; *Siefert, E. 1896. *Dicholophus* [*Cariama*] *cristata*. Burmeister, C. H. 1853. Includes *Falco*. Dulong, P. L. 1841. *Gallus*. Bourgeois, N. 1896; *Brandes, G. 1923, 1924a, b. *Phalaenoptilus*. Marshall, M. E. 1906. *Streptopelia*. Boussingault, J. B. 1844.

Artificial respiration. *Columba*. Nagel, W. A. 1901.

Measurements. *Anas*. Bieletzky, N. F. 1878.

Plethysmographic records. *Columba*. Grünwald, J. 1904.

Respiration in flight. Singing birds. Csörgy, T. 1922.

Respiration in high altitude. *Ciconia*. Walker, O. 1899. *Gymnogyps*. Rabes, O. 1904.

Respiration in tissue. *Columba*, *Corvus*, *Gallus*, *Larus*, *Meleagris*, & *Passer*. Lojaco, M. 1910.

APNEA

General. Foà, C. 1911. *Anas*. Orr, J. B. & Watson, A. 1913; Paton, D. N. 1912, 1913, 1914. *Columba* & *Gallus*. Treves, Z. & Maiocco, F. 1905.

Postural apnea. *Anas*. Koppányi, T. & Kleitman, N. 1927a; Paton, D. N. 1913. *Cygnus*. Paton, D. N. 1927.

Submergence in water. *Anas*. Paton, D. N. 1914. *Cygnus*. Paton, D. N. 1927.

ASPHYXIA

Carbon dioxide and oxygen determinations in asphyxia. *Anas*. Langlois, J. P. & Richet, C. R. 1898b.

Composition of air at different pressures and temperatures. Bert, P. 1872.

Death from asphyxia. Experimental study. Includes birds. Veratti, J. 1773.

Effect of atropine on duration of asphyxia. *Anas*. Richet, C. R. 1894b.

Resistance to asphyxia

Confined air. *Anas* & *Columba*. Pachon, V. 1907.

Effect of atropine. *Anas*. Richet, C. 1894b.

Effect of training on resistance to asphyxia. *Anas*. Richet, C. R. 1898.

Survival in different oxygen pressures. *Columba* & *Streptopelia*. Riddle, O. 1920b.

SUBMERGED IN WATER

General. Aquatic birds. Edmonston, L. 1827. *Anas*. Malassez, L. C. 1894.

Gallus compared with *Anas*. Langlois, J. P. & Richet, C. R. 1899.

Lived seven minutes. *Anas*. Richet, C. R. 1894a, b, 1899.

Oxygen measurement. *Anas*. Langlois, J. P. & Richet, C. R. 1898a, b.

BIOCHEMISTRY OF RESPIRATION

General. Includes birds. Regnault, V. & Reiset, J. 1849.

Dissociation of oxyhemoglobin. Includes *Gallus*. Hüfner, C. G. 1901.

Carbon dioxide

Estimation. Includes *Gallus*. Pott, R. 1875.

Expiration. Bird held under water for various intervals. Measurement. *Anas*. Langlois, J. P. & Richet, C. R. 1898a, b.

Temperature. Effect on production of carbon dioxide. Includes *Passer* & *Fringilla coelebs*. Lettelier, F. 1845.

Gas exchange in lungs and air sacs

General. Siefert, E. 1897.

Measurements. Allen, W. & Pepys, W. H. 1829, 1830.

Measure of combustion. *Anas*, *Anser*, *Carduelis*, *Columba*, *Gallus*, & *Meleagris*. Richet, C. R. 1890.

Volume of respired air and gases. *Gallus* incidental. Treviranus, G. R. 1831b.

BREATHING OR RESPIRATORY MOVEMENTS

General. Albers, J. A. 1800b; Jones, F. W. 1913. Includes birds. Bert, P. 1869; Cavalié, M. 1898a.

Breathing through air sacs in opened humerus. *Anas*. Schultz, P. 1896. *Ardea*. Scolopax 1888.

Correlation between inhalation and wing strokes. Many species. *Zimmer, K. 1935a.

Emotional effects. *Columba*. Rouse, J. E. 1905.

Throat movements. Includes *Gallinae* & *Penelope*. Heinemann, C. 1884.

Experimental studies

General. Includes *Anas*. Boyle, R. 1870.

Experiments with inhaling of soot and examination of lungs and air sacs. *Columba*. Walter, W. G. 1934.

Expiration of free nitrogen. *Columba* & *Gallus*. *Krogh, A. 1906.

Innervation involved in breathing

General. Cavalié, M. 1898b.

Function of dorsal sympathetic ganglion. *Anas* & *Columba*. Cavalié, M. 1898c.

Influence of inferior laryngeal nerve. Includes birds. Emmert, A. G. 1812.

Respiratory center. *Columba*. Nikolaides, R. 1914.

Vagus nerve. Function in respiration. Couvreur, E. 1890, 1891a. *Columba*. Nikolaides, R. 1914.

EXPERIMENTAL LESIONS

Destruction of thalamus. Effect on respiratory exchange. *Columba*. Rogers, F. T. & Laekey, R. W. 1923.

Section of

Intercostal nerves. *Anas*. Cavalié, M. 1898b.

Vagus nerves. *Columba*. Couvreur, E. 1890, 1891a.

Rate of breathing

General. Fabani, C. 1896a; Falkenstein,—. 1873. *Anas*, *Anser*, *Columba*, *Gallus*, & *Meleagris*. Löer, F. 1909d, e.

Numbers of inhalations per second at rest and in flight. Many species. *Zimmer, K. 1935a.

Relation between respiratory rhythm and heart rate. Artom, C. 1925.

EMBRYONIC RESPIRATION

Book. Text in Latin. Includes *Gallus*. Mayow, J. 1674.

General. Bellini, L. 1695; Gloger, C. W. 1856e; Hehl, J. C. 1796; Homeyer, A. V. & Kossler, P. 1862; Loisel, G. 1900e; Ogilvie, G. 1867; Riddle, O. 1924b; Rufz de Lavison, E. 1864. Many species. Paris, J. A. 1821. Includes birds. Serres, A. E. 1840.

Anas. Baudrimont, A. & Saint-Ange, M. 1843; Windle, W. F. & Nelson, D. 1938. *Anser*. Hüfner, C. G. 1892. *Gallus*. Baudrimont, A. & Saint-Ange, M. 1843; Daresté, C. 1889c; Hasselbalch, K. A. 1900, 1902; Hüfner, C. G. 1892; Pott, R. 1877; Pott, R. & Preyer, W. 1882; Rabaud, E. 1908c; Tangl, F. 1908a, b. Includes *Gallus*. Serres, A. E. 1839. *Meleagris*, *Numida*, & *Pavo*. Baudrimont, A. & Saint-Ange, M. 1843.

Absorption from air sac of incubating egg. *Gallus*. Hanan, E. B. 1925.

Changes in amount of air entering egg. Effect on embryo. Gerlach, L. 1885.

Heat production in oxidation. Mey-erhof, O. 1911.

Measurements. *Gallus*. Stěpánek, O. 1904.

Regional differences. *Gallus*. Buchanan, J. W. 1926.

Experimental studies

General. *Gallus*. Aggazzotti, A. 1915.

Carbon dioxide production. *Gallus*. Bohr, C. & Hasselbalch, K. A. 1899.

Oxygen consumption rate. Parts of embryo. *Gallus*. Shearer, C. 1924.

COATING OF EGG

See also under **Embryology**.

General. *Gallus*. Düsing, K. 1883.

Respiration in oxygen atmosphere. *Gallus*. Pott, R. 1883.

Varnishing the egg kills the embryo. Tarulli, L. 1891.

RESPIRATORY ORGANS

For physiology of respiratory organs see under **Respiration**.

Books. Text in English. Owen, R. 1866-68.

Text in French. Geoffroy St. Hilaire, E. 1818a.

Text in German. Barkow, H. C. 1871; Gadow, H. 1891c. *Anas*, *Ardea*, *Buteo*, *Colymbus*, *Cygnus*, *Fulica*, *Gallus*, & *Strix*. Aeby, C. T. 1880.

General. Jäger, G. F. 1832; Kovalovsky, S. 1909; Merrem, B. 1783; Serres, A. E. 1846. Many species. Oppel, A. 1902a. Includes birds. Sicard, H. 1869.

Anas. *Sour, J. M. 1896b. *Anser*. Schröder van der Kolk, J. L. 1859-60. *Chauna*. Beddard, F. E. 1886c. *Columba*. Drosier, W. H. 1886; *Sour, J. M. 1896b. *Fulica atra* & *Gallinula*. Roché, G. 1890a. *Gallus*. *Sour, J. M. 1896b. *Megapodidae*. Oustalet, E. 1880a. *Pelecanus* [*Moris*] *bassana*. Montagu, G. 1810. *Psophia crepitans*. Traill, T. S. 1826. *Rallinae*. Roché, G. 1890a; Roge, G. 1889. *Rhea*. Gadow, H. F. 1885; Parker, W. N. 1883.

Development of respiratory system. *Gallus*. Livini, F. 1914-17; *Rathke, M. H. 1828b. Includes *Gallus*. Thomson, A. 1830.

Excellent diagrams of respiratory organs. *Gallus* & *Columba*. *Brandes, G. 1924a.

Experimental study. Musset, C. 1869.

Anatomy

General. *Baer, M. 1896b; Gouillot, N. 1846. *Micropterus cinereus*. Cunningham, R. O. 1871-72.

Head. Respiratory passages and air sacs. Mihálikovics, G. V. 1896.

Histology. Book. Text in German. Many species. Oppel, A. 1896-97.

Innervation. *Anser* & *Gallus*. Bourgeois, N. 1896.

Muscles. Many species. *Zimmer, K. 1935a. Includes *Columba* & *Gallus*. Hess, W. R. & Ryffel, W. 1923.

Nostrils obliterated and nasal chambers connected with pharynx by very small passages. *Phalacrocorax*. Ewart, J. C. 1882.

Skeletal structures. Many species. *Zimmer, K. 1935a.

AIR SACS

Books. Text in English. Hunter, J. 1786.

Text in French. Lereboullet, A. 1838. *Gallus*. *Campana, A. 1875. Includes *Struthio*. Perrault, C. 1671.

General. Amans, P. C. 1912a; Baer, M. 1896a, 1897; Berthelot, S. 1869; Boulart, R. 1882; Brandes, G. 1924a, b; Colas,—. 1826; Dei, A. 1895b; Fatio, V. 1867; Girardi, M. & Malacarne, V. 1784; Headley, F. W. 1893a, b; Hertwig, R. 1903; Jacquemin, E. 1835b, 1836b, 1842; Jeffries, J. A. 1883h; Kohlrusch, P. H. 1832; Murray, I. D. 1908; Nietsch, V. 1905; Nitzsch, C. L. 1804, 1808; Otto, B. C. 1777; Plateau, F. 1880; Retzius, A. A. 1831; Sappey, M. P. 1846; Seeley, H. G. 1866; Tarnani, I. K. 1914; Tigri, A. 1871; Walcher,—. 1908; Winter, W. 1905. Many species. Brandes, G. 1924a; *Guillot, N. 1846; *Juillet, A. 1912b; Milne-Edwards, A. 1865, 1867; Perrault, C. 1733b; Rabes, O. 1905; *Roché, G. 1890b, 1891; *Strasser, H.

1877. Include birds. Siefert, E. 1896; Zumstein, J. J. 1901.

Anas. Juillet, A. 1911b. *Aptenodytes demersa*. Jäger, G. F. 1832. *Apteryx*. Huxley, T. H. 1882; Strasser, H. 1877. *Buteo*. Strasser, H. 1877. *Calao rhinoceros*. Milne-Edwards, A. 1885. *Casuarus*. Beddard, F. E. 1886a. *Cathartes*. Bignon, F. 1889b. *Ciconiidae*. Boulart, R. 1879. *Columba*. Brandes, G. 1923; Nikolaides, R. 1914; Strasser, H. 1905. *Corvus*. Hamborg, E. 1923. *Cygnus*. Daresté, C. 1862g. *Dromaeus*. Knox, R. 1832; Malm, A. W. 1880b. *Erismatura jamaicensis*. Wetmore, A. 1917b. *Gallus*. Brandes, G. 1923; Hamborg, E. 1923; Juillet, A. 1911d, 1912a, b; Schröder van der Kolk, J. L. 1859-60; Strasser, H. 1877. *Graculus*. Lucas, F. A. 1894b. *Leptoptilus*. Peters, W. H. 1866. *Nothocrax*. Beddard, F. E. 1886b. *Ossi-fraga*. Cazin, M. 1886b. *Pelecanus*. Lucas, F. A. 1894b; Méry, J. 1730, 1733f. *Pelecanus* [Moris] *bassana*. Montagu, G. 1810. *Pelecanus rufescens*. Martin, W. C. 1835b; Owen, R. 1835. *Perdix*. Juillet, A. 1911b. *Phalacrocorax*. Lucas, F. A. 1894b. *Phaleris*. Vian, J. 1876. *Psittaci*. Nitzsch, C. L. 1859. *Psittacus*. Schröder van der Kolk, J. L. 1859-60. *Psophia crepitans*. Traill, T. S. 1826. *Struthio*. Perrault, C. P. 1733a; Roché, G. 1888. Includes *Struthio*. Perrault, C. 1672. *Sula* [Moris] *bassana*. Bignon, F. 1889c; Owen, R. 1830-31. *Tachypetes aquilum*. Vigors, N. A. 1830-31b. *Tantalus*. Boulart, R. 1885.

Development. Locy, W. A. & Larsell, O. 1916a, b. *Anas*. Pizon, A. 1891. *Gallus*. *Bertelli, D. 1900b, 1904, 1905; Larsell, O. 1914; Pizon, A. 1891; Poole, M. 1909; *Rathke, M. H. 1828b; Selenka, E. 1866.

Anatomy

General. Many species. Schröder van der Kolk, J. L. 1859-60; *Schulze, F. E. 1912; Weber, E. F. 1842. *Columba*. *Müller, B. 1907; Thilo, O. 1915. *Diomedea*. *Ulrich, F. 1904. *Gallus*. Bertelli, D. 1905. *Leptoptilus*. Mouquet, A. 1925.

LUNG CONNECTIONS

General. *Gallus*. Juillet, A. 1911d.

Connection of mandibular air sacs with lung air sacs. *Pelecanus rufescens*. Owen, R. 1835, 1835-36.

Fungi in air sacs

Aspergillus in *Columba*. Generali, G. 1879b.

Mucor. Yarrell, W. 1842.

Histology

General. *Anas*. *Ficalbi, E. 1883. *Buteo*. Eberth, C. J. 1863. *Ciconia*. Waniczukówna, H. 1909. *Columba*. Eberth, C. J. 1863; Müller, B. 1907; Waniczukówna, H. 1909. *Corvus*, *Cypselus*, & *Fringilla*. Waniczukówna, H. 1909. *Gallus*. *Ross, M. J. 1899; Waniczukówna, H. 1909.

Epithelium. Tourneaux, F. & Hermann, G. 1876.

Smooth muscle. Includes *Gallus*. Piso-Borme, G. 1870.

Physiology

Book. Text in English. Anon. 1782.

General. Jones, F. W. 1913; Soum, J. M. 1896a. *Columba*. François-Franck, C. A. 1906. *Diomedea*. *Ulrich, F. 1904. *Leptoptilus*. Mouquet, A. 1925.

Action at high altitudes. *Gymnogyps*. Rabes, O. 1904.

Experimental studies. Musset, C. 1869.

Hyperdilation. *Sturnus vulgaris*. Landois, H. 1884b.

Spontaneous rhythmical contractions of musculature. Embryo in tissue culture. *Gallus*. Lewis, M. A. 1924.

FUNCTIONS OF AIR SACS

Book. Text in English. Hunter, John 1786.

General. Amans, P. C. 1912a; *Billard, G. 1924; Hunter, John 1774; Kohlrusch, P. H. 1832; Siefert, E. 1897; Soum, J. M. 1896a; Vescovi, P. 1894. Many species. Schröder van der Kolk, J. L. 1859-60; *Schulze, F. E. 1912.

Anas. Strohl, J. 1910a. *Columba*. Dubois, R. 1906; François-Franck, C. A. 1906; *Müller, B. 1907; Strohl, J. 1910a; Thilo, O. 1915. *Lagopus* & *Larus*. Strohl, J. 1910a.

Changing specific gravity by expelling air from air sacs when diving. *Sula* [Moris] *bassana*. Owen, R. 1830-31.

Cooling action. *Buteo*, *Columba*, & *Corvus*. Victorow, C. 1909.

Flight. Schenk, H. 1926.

Giving rigidity to wings, legs, and neck when inflated. *Columba*. Thilo, O. 1915.

Inflation of breast air sacs in strutting. *Centrocercus urophasianus*. Horsfall, R. B. 1920.

Use of air sacs as oxygen reservoir in diving. Csörgey, T. 1926c.

Special air sacs

Large throat-pouch air sac. *Tachypetes aquilus*. Vigors, N. A. 1830-31b.

Tracheal air sac. *Erismatura jamaicensis*. Wetmore, A. 1917c, 1918d.

SKELETAL AIR SACS

See also under **Skeleton**: Pneumaticity.

Skull. Bignon, F. 1887, 1888a, b.

Vertebrae. Bignon, F. 1888a.

LARYNX

Books. Text in German. Humboldt, F. H. 1806.

Text in Latin. *Ardea*, *Corvus*, & *Gallus*. Casserius, J. 1601.

General. Girardi, M. & Malacarne, V. 1784. Many species. Mayer, A. F. 1852. Include birds. Hochstetter, F. 1895; Müller, J. P. 1839b. Birds incidental. Mayer, A. F. 1844.

Casuarus. Thébault, V. 1891. *Chrysopterus* & *Diomedea*. Pavesi, P. 1876-77. *Dromaeus* [*Dromiceius*]. Duchamp, G. 1853. *Erismatura jamaicensis*. Wetmore, A. 1917c. *Fulica*. Nitzsch, C. L. 1826a. Includes *Gallus*. Schmidt, H. W. 1911. *Manucodia*. Pavesi, P. 1876-77. *Melanitta*. Miller, W. D. 1916. *Notornis*. Benham, W. B. 1899a, b. *Oidemia* & *Pelionetta*. Miller, W. D. 1916. *Phaethon*. Brandt, J. F. 1840b. *Phalacrocorax*. Duges, A. 1899. *Picidae*. Leiber, A. 1907a. *Psophia crepitans*. Traill, T. S. 1826. *Regulus*. Greschik, E. 1918b. *Scolopax*. Nitzsch, C. L. 1826a.

Cause of reduction of larynx. Brunelli, G. 1904.

Development. *Anas* & *Columba*. Bertelli, D. 1906. Includes *Aquila* & *Gallus*. Rathke, H. 1828b. *Gallus*.

Bertelli, D. 1906; Kashchenko, N. F. 1887. Includes *Gallus*. Schmidt, V. 1910.

Anatomy

General. Many species. *Boccus, W. 1858. *Anas*, *Columba*, & *Gallus*. Bertelli, D. 1906.

Epiglottis (rudimentary) present. *Diomedea*. Bennett, F. D. 1833. *Fulica* & *Scolopax*. *Nitzsch, C. L. 1826a.

Immature structure. Capon. *Gallus*. Hosoya, Y. 1915.

Innervation. Birds incidental. Couvreur, E. 1899.

Physiology

Function. Segond, L. A. 1851.

Role of inferior laryngeal nerve. Experimental study. Includes birds. Emmert, A. G. 1812.

LUNGS

Book. Text in French. Includes birds. Lereboullet, A. 1838.

General. Amans, P. C. 1912b; Dei, A. 1895b; Headley, F. W. 1893a; Juillet, A. 1911a; Retzius, A. J. 1831; Sappey, M. P. 1846; Schröder van der Kolk, J. L. 1858, 1859-60. Many species. Rabes, O. 1905. Includes birds. Oppel, A. 1902a. Birds incidental. Bazin, A. 1839.

Anas. Juillet, A. 1911b. *Anser*. Schröder van der Kolk, J. L. 1859-60. *Columba*. Colas, —. 1825, 1826; Strasser, H. 1905. *Corvus*. Colas, —. 1825, 1826. *Dromaeus* [*Dromiceius*]. Knox, R. 1832. *Falco*. Colas, —. 1825, 1826. *Gallus*. Campana, A. 1870; Hunter, J. 1774; Juillet, A. 1911b, d; Schröder van der Kolk, J. L. 1859-60. *Perdix*. Juillet, A. 1911b.

Anatomy

General. Campana, A. 1870; Fischer, G. 1905; *Juillet, A. 1912b; Supino, F. 1899. Many species. Bertelli, D. 1901; Weber, E. F. 1842. Birds incidental. Rossignol, I. H. 1847. *Psittaci*. Schröder van der Kolk, J. L. 1859-60. *Struthio*. Schulze, F. E. 1908.

Development

General. Include birds. Heiss, R. 1923; *Locy, W. A. & Larsell, O. 1916a,

b. *Anas*. *Rösler, H. 1911; Weber, A. 1928; Weber, A. & Buvignier, A. 1903b. *Gallus*. Bertelli, D. 1900a, 1901; Beselin, O. 1923; Fischelis, P. 1885a; Juillet, A. 1911c; Kashchenko, N. F. 1887; *Mantel, R. 1914; Moser, F. 1902; Poole, M. 1909; *Rathke, M. H. 1828b; *Rösler, H. 1911; Seessel, A. 1877; Selenka, E. 1866; Weber, A. 1928. *Gallus* incidental. Heiss, R. 1922. *Micropus* & *Passer*. *Rösler, H. 1911.

EARLY DEVELOPMENT

General. *Gallus*. Weber, A. & Buvignier, A. 1903c, d.

Effects of high temperatures. *Gallus*. Weber, A. 1918.

Histology

General. Leydig, F. 1854a. *Anas*. Bratianu, S. & Guerriero, C. 1930; Ogawa, C. 1920. *Anser*. Ogawa, C. 1920. *Buteo*. Eberth, C. J. 1863. *Columba*. Bratianu, S. & Guerriero, C. 1930; Eberth, C. J. 1863; Ogawa, C. 1920. *Gallus*. Ogawa, C. 1920; Rainey, G. 1849. *Passer*. Ogawa, C. 1920.

Cells containing lipid granules. Wenslaw, A. 1926.

Epithelium. Includes birds. Elenz, E. 1864. Embryo. *Gallus*. Küttner, —. 1876.

Extent and character of respiratory surfaces. Includes *Columba*. Sussdori, M. 1907.

Innervation. Lühe, M. 1900.

Weight in relation to flight power. Magnan, A. 1912k, n.

BRONCHIAL SYSTEM

Bronchial tubes. Spontaneous contractions of musculature. Embryo. *Gallus*. Lewis, M. A. 1924.

Comparative anatomy. *Fischer, G. 1905.

Bronchi

General. Nitzsch, C. L. 1808. Includes *Gallus*. Rathke, H. 1828b. *Psittacus*. Jacobaeus, O. 1675a.

Swellings or diverticulae. *Diomedea*. Swinhoe, R. 1873b.

Recurrent bronchi

General. *Gallus*. Juillet, A. 1912a, b.

Development. Locy, W. A. & Larsell, O. 1916a. *Gallus*. *Larsell, O. 1914.

PLEURA

Development. *Gallus*. Bertelli, D. 1900a, 1901.

Histology. Many species. Bertelli, D. 1901. *Anas*, *Buteo*, *Cygnus*, *Gallus*, & *Meleagris*. Oppel, A. 1902a.

Relations of visceral pleura to thoracic wall. *Columba* & *Uria*. Durand, —. 1909.

Physiology

General. Jones, F. W. 1913. *Anas*. Bratianu, S. & Guerriero, C. 1930. *Anser*. Schröder van der Kolk, J. L. 1859–60. *Columba*. Bratianu, S. & Guerriero, C. 1930. *Gallus*. Schröder van der Kolk, J. L. 1859–60. *Psittaci*. Schröder van der Kolk, J. L. 1859–60.

Experimental study. Jaulmes, C. 1925.

OBLIQUE SEPTUM OR DIAPHRAGM OF BIRDS

General. Beddard, F. E. 1885a, 1888a, 1896e; Girardi, M. & Malacarne, V. 1784; Juillet, A. 1911a; Sappey, M. P. 1846. Includes birds. Butler, G. W. 1889; Siefert, E. 1896.

Anas. Juillet, A. 1911b, d; Soum, J. M. 1896b. Includes *Anas*. Rouget, C. 1852. *Apteryx*. Huxley, T. H. 1882. *Columba*. Soum, J. M. 1896b. *Dissoura*. Beddard, F. E. 1896b. *Fratercula*. Beddard, F. E. 1887. *Gallus*. Bertelli, D. 1898a; Butler, G. W. 1889; Hunter, J. 1774; Juillet, A. 1911b, d; Soum, J. M. 1896b. Includes *Gallus*. Uskov, N. V. 1883. *Passeriformes*. Beddard, F. E. 1896e. *Perdix*. Juillet, A. 1911b, d.

Development. *Gallus*. Bertelli, D. 1898a, b, 1900a, b, 1904, 1905; Cadiat, L. O. 1878b; *Poole, M. 1909; Ravn, E. 1895, 1896, 1899.

Innervation. *Anas*, *Columba*, & *Gallus*. Cavalié, M. 1898d.

Musculature. Tigri, A. 1871.

Pulmonary and thoraco-abdominal divisions. *Eudypetes*. Filhol, H. 1882d.

TRACHEA

Books. Text in English. *Cygnus*. Cooke, T. 1823.

Text in German. Barkow, H. C. 1871.

Text in Latin. Aldrovandus, U. 1610-13.

General. Bauer, F. 1825; Colas,—. 1826; Meckel, J. F. 1823; Nitzsch, C. L. 1808; Retzius, A. A. 1831. Many species. Forbes, W. A. 1881g; *Latham, J. 1798; Milne-Edwards, A. 1865; Richiardi, S. 1860, 1876; *Yarrell, W. 1833b.

Anas. Yarrell, W. 1827a. *Anas punctata*. Newton, A. 1871. *Anserinae*. Frere, H. T. 1846b. *Anthropoides paradisaeus*. Yarrell, W. 1835. *Anthropoides virgo*. Yarrell, W. 1827a. *Aptenodytes*. Forster, J. R. 1781. *Ardea*. Yarrell, W. 1827a. *Casuarus*. Thébault, V. 1891; Wedemeyer, G. 1824. *Cathartidae*. Beddard, F. E. 1903a. *Centropus*. Bernstein, H. A. 1860a, b. *Cephalopterus*. Tschudi, J. J. 1843. *Cephalopterus penduliger*. Eyton, T. C. 1861. *Cereopsis novae-hollandiae*. Yarrell, W. 1831a. *Chrysopterus*. Pavesi, P. 1876-77. *Cochleariidae*. Murie, J. 1872b. *Corythaix*. Martin, W. C. 1836a. *Cygnus*. Sharpless, J. F. 1832; Yarrell, W. 1830. *Cygnus buccinator*. Murie, J. 1867a; Yarrell, W. 1832a. *Diomedea*. Pavesi, P. 1876-77; Swinhoe, R. 1873b. *Dromiceius*. Duchamp, G. 1853; Knox, R. 1824c. *Eurypygidae*. Murie, J. 1872b. *Grus*. Pavesi, P. 1874, 1876-77. *Histrionicus torquatus*. Newton, A. 1859. *Manucodia*. Pavesi, P. 1876-77. *Melanitta*. Miller, W. D. 1916, 1926. *Mergus*. Allis, T. 1832c; Yarrell, W. 1827a. *Mergus castor*. Knox, T. 1832. *Numida*. Yarrell, W. 1827a. *Nyroca leucophthalmus*. Smith, J. A. 1858c. *Oidemia*. Miller, W. D. 1916, 1926. *Opisthocomus cristata*. Perrin, J. B. 1877. *Otis*. Pycraft, W. P. 1898c. *Pelionetta*. Miller, W. D. 1916. *Penelope*. Tschudi, J. J. 1843. *Psittacus*. Jacobaeus, O. 1675a. *Psophia crepitans*. Traill, T. S. 1826. *Rhinocetidae*. Murie, J. 1872b. *Sarcophamphus*. Beddard, F. E. 1890a, 1902c. *Steatornis caripensis*. Garrod, A. H. 1873c; Müller, J. P. 1842a. *Stictonetta naevos*. Campbell, A. J. 1899. *Tantalus*. Garrod, A. H. 1878g; Swinhoe, R. 1867. *Tetrao*. Yarrell, W. 1830-31. *Thalassidroma*. Macgillivray, W. 1838-39. *Trochilus colubris*. Crisp, E. 1862b. *Uria*. Macgillivray, W. 1838-39. *Vanellus*. Garrod, A. H. 1878g.

Development. Includes *Corvus* & *Falco*. Fleischmann, P. 1823. *Gallus*. Beselin, O. 1923. Includes *Gallus*. Rathke, H. 1828b. *Gallus* incidental. Heiss, R. 1922; Schmidt, V. 1910.

Physiology of trachea. *Bucephala*. Fiori, A. 1884.

Anatomy

General. *Bucephala*. Fiori, A. 1884.

Compressed laterally in inferior portion. *Tantalus*. Brookes, J. 1833.

Extension almost to vent. *Ouarax mitu*. Yarrell, W. 1831d.

Lack of connection with nasal chambers. *Graculus carbo*. Olphe-Galliard, V. A. 1885.

Ossifications. *Cuculidae*. Shufeldt, R. W. 1901f.

MODIFICATIONS IN TRACHEA

General. *Tetrao urogallus*. Martin, L. 1870a.

Enlargements

General. *Anatidae*. Gurney, J. H. Jr. 1877. *Bulla ossea*. *Anas*. Newton, A. 1871; Ramsey, E. P. 1878-79. *Clangula*. Good figures. Brooks, A. 1920. *Nyroca* & *Stictonetta*. Ramsay, E. P. 1878-79.

Enlargements and labyrinth. *Mergus allbellus* & *M. serrator*. Allis, T. 1832c.

Swelling. *Diomedea brachyura*. Swinhoe, R. 1867.

Tracheal bulb in male. Structure and function. *Anatidae*. Finn, F. 1900b.

Tracheal pouch. *Anthropoides*. Yarrell, W. 1827a. *Dromaeus* [*Dromiceius*]. Anderson, R. 1856; Coughtrey, M. 1873b; Gadow, H. F. 1891a, d; *Murie, J. 1867b.

Loops or coils of the trachea

The trachea is variably coiled in some groups, the cells sometimes invading the sternum.

General. Many species. Rabes, O. 1905. *Anas magellanica*. Yarrell, W. 1833c. *Anatidae*. Gadow, H. F. 1891d; Gurney, J. H. Jr. 1877. *Anser gambensis*. Yarrell, W. 1841. *Anthropoides*. Yarrell, W. 1827a. *Aramus scolopaceus*. Eyton, T. C.

1846. *Craz*. Yarrell, W. 1833b. *Craz yarrellii*. Yarrell, W. 1831e. *Cygnus buccinator*. Yarrell, W. 1832a. *Diomedea brachyura*. Swinhoe, R. 1867. *Grus*. Allen, J. A. 1880c. *Manucodia*. Beddard, F. E. 1891b; Forbes, W. A. 1882j; Gould, J. 1866; Pavesi, P. 1874, 1876-77. *Nothocrax*. Beddard, F. E. 1886b. *Nyroca leucophthalmus*. Smith, J. A. 1858c. *Penelope*. Yarrell, W. 1833c. *Phonygama*. Forbes, W. A. 1882j; Ogilvie-Grant, W. R. 1904b. *Platalea*. Garrod, A. H. 1875d; Yarrell, W. 1833b. *Tantalus*. Garrod, A. H. 1875d.

Coils in sternum. Dieck, R. 1865. *Antigone*. Berney, F. L. 1905. *Cygnus*. Aldrovandus, U. 1610-13; *Parsons, J. 1766; Smith, J. A. 1863b. *Cygnus buccinator*. Yarrell, W. 1832a. *Grus*. *Roberts, T. S. 1880. Includes *Grus*. *Parsons, J. 1766. *Olor*. Dionne, C. E. 1918. *Olor buccinator*. Coale, H. K. 1915. Book. Text in German. *Grus*. Berthold, A. A. 1831. Book. Text in English. Good pictures. *Blyth, E. 1881.

Convolution absent in some specimens. *Platalea*. Langdon, H. 1880.

Structure and development. *Rhynchoa capensis*. Wood-Mason, J. 1878.

Histology

General. *Buteo* & *Columba*. Eberth, C. J. 1863.

Autonomic innervation. *Gallus*. Thébault, V. 1896g.

SENSES

See also under Behavior, Brain, Ear, Eye, Hearing, Nervous system, Olfactory organs, Smell, and Taste.

Books. Text in English. Allen, G. M. 1925; Aristotle 1910; Chapman, F. M. 1912b; Morgan, C. L. 1900; Rennie, J. 1835. Includes birds. Washburn, M. F. 1926.

Text in German. Include birds. Aristotle 1868; Hempelmann, F. 1926.

General. Löns, E. 1909. *Columba* & *Gallus*. Mills, T. W. 1895.

Acuity of senses. Ménégau, H. A. 1907b.

TACTILE SENSE

Book. Text in English. Includes birds. Kidd, W. A. 1907.

Behavior of birds in maze. Sado-vinkova, M. P. 1923b.

SEX

See also under Behavior, Castration, Endocrinology, Genetics, Habits, Ovary, Reproduction, Testes, and Urogenital system.

Books. Text in English. Howard, H. E. 1935; Pycraft, W. P. 1910a. Include birds. Blackwell, A. L. 1875; Brambell, F. W. 1930; Morgan, T. H. 1913. *Molothrus*. Friedmann, H. 1929.

Text in French. Boubier, M. 1926b.

Text in German. Lucanus, F. K. 1925. Include birds. Deegener, P. 1918; Meisenheimer, J. 1921, 1930.

Text in German and Slavic. *Gallus*. Zawadowsky, M. M. 1922.

General. Gladstone, H. S. 1911b; Gröbbels, F. 1911a; Anon. 1879-80. Includes birds. Minot, C. S. 1880a.

Columbidae. Riddle, O. 1925b. *Corvus corone*. Meise, W. 1928. *Gallus*. Girou de Buzareingues, C. 1828; Nonidez, J. F. 1929. *Meleagris*. Girou de Buzareingues, C. 1828.

Alternation of sex with age in brood. *Falco sparverius*. Shufeldt, R. W. 1898b.

Blood test. Crew, F. A. 1926b.

Cryptorchids. Pézard, A. 1922a, 1923a.

Differential effects of calcium salts on rate of growth. *Gallus*. Pearl, R. 1916d.

Effects of transplantation of testes. *Gallus*. Gelei, J. 1924.

Homosexuality. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938.

Hypermasculinization of male. *Gallus*. Benoit, Jacques 1928a.

Late broods, sex of. *Larus ridibundus*. Noll, H. 1931.

Recognition of sex, mutual. Krohn, H. 1924.

Specificity of sex. Not changed in gonad grafts. *Gallus*. *Willier, B. H. 1927b.

CASTRATION, EFFECTS ON SEX

See also under **Castration**.

General. Dönhoff, E. 1876a. Anatidae. Bulliard, H. & Champy, C. 1930. *Gallus*. Benoit, Jacques 1924c, f; Davenport, C. B. 1912a.

Body weight. Ratio to brain weight. Include *Colinus*, *Gallus*, & *Passer*. Dubois, E. 1919a, b.

Brain weight. Include *Colinus* & *Gallus*. Dubois, E. 1919a, b. Include *Passer*. Dubois, E. 1919a, b; Lapicque, L. 1907a.

Development of maternal instinct. *Gallus*. Breton, P. 1889.

Diets, unusual. Effects. Houssay, F. 1903a.

Egg composition and size. Riddle, O. 1912c.

Egg weights. *Gallus*. Jull, M. A. 1924a; Jull, M. A. & Quinn, J. P. 1924, 1925.

Form of egg. Petit, —. 1900. *Gallus*. Jull, M. A. & Quinn, J. P. 1924.

Growth rate. *Gallus*. Holmes, A. D., Pigott, G. M., & Campbell, P. A. 1932.

Incomplete castration. Regeneration of testes. *Gallus*. Benoit, Jacques 1926c.

Number of red blood corpuscles. *Gallus*. Juhn, M. & Domm, L. V. 1930.

Relation to testicular asymmetry. No correlation in most birds. Friedmann, H. 1927c.

Survival in increased and decreased pressure of oxygen. *Columba* & *Streptopelia*. Riddle, O. 1920b.

Utilization of food. *Meleagris*. Brooks, F. D. 1933.

Variations in arginase content. *Gallus*. Chaudhuri, A. C. 1928b.

Yolk value. *Columba*. Riddle, O. 1918b.

DETERMINATION OF SEX

Books. Text in English. Includes birds. Morgan, T. H. 1919b.

Text in German. *Columba*. Lenhossek, M. 1903. Include *Gallus*. Lenhossek, M. 1903; Witschi, E. 1929.

General. Bateson, W. 1908; Brambell, F. W. 1924b; Riddle, O. 1917a.

Include birds. Düsing, K. 1884; Kovalevsky, S. 1911; Moore, C. R. 1925; Riddle, O. 1914a; Swingle, W. W. 1926.

Columba. Chidester, F. E. 1923. Includes *Columba*. Cuénot, L. 1899. Columbidae. Riddle, O. 1914a, 1916a, 1917b, 1918b, 1920b, 1920-21, 1927d, 1929. *Gallus*. Corinaldesi, F. 1927a; Cuénot, L. 1923; Guyer, M. F. 1916; Morgan, T. H. 1917a. *Gennaeus*. Cuénot, L. 1923. *Scolopax rusticola*. Scharff, R. F. 1908. *Serinus*. Heape, W. 1907. *Squatarola*. Snyder, L. L. 1930. *Streptopelia*. Riddle, O. 1920b, 1920-21; Strong, R. M. 1912a, c.

Quantitative theory of Riddle. Goldschmidt, R. 1927.

Relation to size and chemical composition of eggs. *Columba*. Riddle, O. 1912b.

Sex chromosomes. Crew, F. A. 1925c, d; Hance, R. T. 1924, 1925a. Birds incidental. p. 252. Schleip, W. 1912.

Stale sperm factor. *Streptopelia*. Riddle, O. & Behre, E. H. 1921a.

DEVELOPMENT AND DIFFERENTIATION OF SEX CHARACTERS

General. Kammerer, P. 1912. Includes birds. Moore, C. R. 1925. Birds incidental. Nussbaum, M. 1880. *Gallus*. Bonnier, G. 1928a; Coste, J. J. & Delpach, J. M. 1864; Nussbaum, M. 1901b; Pézard, A., Sand, K., & Caridroit, F. 1926e; Romanoff, A. L. 1933b.

Adrenal cortex, effects on sex character development. *Gallus*. Berner, O. 1923.

Effects of thyroxin administration on sex differentiation. *Gallus*. Greenwood, A. W. & Chaudhuri, A. C. 1928.

In integument. *Gallus*. Mansui, K. 1930.

Gonad grafts in embryo

General. *Gallus* embryos. Greenwood, A. W. 1925a, b, 1928. *Gallus*. *Willier, B. H. & Yuh, E. C. 1928.

Into allantois. *Gallus*. Corinaldesi, F. 1927a, b.

Sex hormones, effects of. *Gallus*. Willier, B. H. 1927a.

Specificity in sex. *Gallus*. *Willier, B. H. 1927b.

DIMORPHISM IN SEX

Book. Text in English. *Davenport, C. B. 1906b.

General. Liston, W. G. 1904; Oustalet, E. 1892; Zitkov, B. M. 1910. Many species. Rozenfelds, M. 1929. *Gallus*. Cole, L. J. & Lippincott, W. A. 1919; Goodale, H. D. 1911a; Goodale, H. D. & Nonidez, J. F. 1924; Pézard, A., Sand, K., & Caridroit, F. 1925c.

Arginase. Absence in female reproductive organs. *Gallus*. Chaudhuri, A. C. 1928b.

Factors. *Gallus*. Danforth, C. H. 1930.

Origin. Young, L. C. 1904.

Relation of sex dimorphism in plumage to luteal cells. Many species. Yocom, H. B. & Philipps, B. I. 1923, 1924.

Variability in skeleton. *Gallus*. Hutt, F. B. 1929c.

Wings. *Passer*. Butler, A. G. 1900a.

Color dimorphism

General. Dewar, D. 1904; Stolzmann, J. 1885.

Iris color. *Cacatua ophthalmica*. Mayer, O. 1928.

GENETICS OF SEX

Books. Text in English. Include *Gallus*. Crew, F. A. 1927b; Punnett, R. C. 1923.

General. Gironcoli, S. 1890; *Hagedoorn, A. L. 1909.

Persistence of characters in skin-graft feathers. *Gallus*. Danforth, C. H. 1929b.

Sex-linked inheritance. See also under **Genetics**. Cunningham, J. T. 1924-25. *Gallus*. Cole, L. J. & Lippincott, W. A. 1919; Goodale, H. D. 1910a, 1911a. *Streptopelia*. Strong, R. M. 1911c, 1912a, c. Books. Text in English. *Gallus*. *Davenport, C. B. 1906b, 1911a; Punnett, R. C. 1923.

Sex chromosomes

See also under **Cytology**.

General. *Anas*. Werner, O. S. 1925, 1927. *Columba*. Oguma, K. 1927. *Gallus*. Boring, A. M. & Pearl, R. 1914; Caridroit, F. 1929; *Guyer, M. 1916;

Hagedoorn, A. L. 1909; *Hance, R. T. 1924, 1925a, b, 1926a, c; Serebrovsky, A. S. & Wassina, E. T. 1926; Warren, D. C. 1924, 1925. *Numida*. Guyer, M. F. 1909d. *Numida* × *Gallus* hybrids. Guyer, M. F. 1912b. *Serinus*. Hagedoorn, A. L. 1909.

Crossing over in sex chromosomes. *Gallus*. Goodale, H. D. 1917a; Serebrovsky, A. S. & Wassina, E. T. 1926.

HYBRID BIRDS, SEX OF

General. Guyer, M. F. 1908, 1909c. Phasianidae. Guyer, M. F. 1908.

Interfamily crosses. Columbidae. Riddle, O. 1925d.

IDENTIFICATION OF SEX WHEN DIFFICULT

General. Noble, G. K. & Vogt, W. 1935; Riddle, O. 1927b.

Blood test. *Gallus*. Crew, F. A. 1926b.

Both sexes similarly colored. Fringillidae. Butler, A. G. 1897f. Psittacidae. Knobel, E. M. 1921.

Embryo. *Gallus*. Lienhart, R. 1921; Ritchie, D. 1824.

Newly hatched birds. *Gallus*. Chincinskij, N. 1910; Dunn, L. C. 1923d; Punnett, R. C. 1919; Yamaguchi, T. 1928.

When interstitial cells appear. *Gallus*. Cilleuls, J. 1912.

MATURITY IN SEX

Effects of light and weather. *Sturnus*. *Bissonnette, T. H. 1930a.

Relation to bursa Fabricii. Jolly, J. 1913a.

PHYSIOLOGY OF SEX

General. *Anas*. Liebe, W. 1914.

Sex passion. Revival of sex in autumn. Brewster, W. 1898a.

Sexual activity. *Gallus*. Upp, C. W. 1928b.

Equipotentiality

Male and female. Include *Anas* & *Gallus*. *Zawadowsky, M. M. 1928, 1929.

Pigmentation in integumental papillae about eye. *Phasianus*. Zawadowsky, M. M. & Kritsch, N. J. 1926.

Intersexuality

Book. Text in English. Includes birds. Brambell, F. W. 1930.

Text in German. Includes birds. Goldschmidt, R. 1931.

General. Brambell, F. W. 1923; Chappellier, A. 1921; Gladstone, H. S. 1911b; Jeffries, J. A. 1883c; Müller, A. 1881; Reichenow, A. 1905; Salerne, F. 1762; Tichomirov, A. A. 1887; van Oordt, G. J. 1931.

Anas. Korschelt, E. 1887; Tichomirov, A. A. 1888. *Colaptes*. Cabanis, J. L. 1874. *Columba*. Jungersen, H. F. 1917. *Corvus*. Zawadowsky, M. M. 1926a. *Eclectus roratus*. Rothschild, L. W. 1902. *Fringilla coelebs*. Blaauw, F. E. 1890a; Harting, J. E. 1890; Weber, M. W. 1890. *Fringillidae*. Chappellier, A. 1911a. *Gallus*. Bonnier, G. 1928b; Crew, F. A. 1923b; Desogus, V. 1925; Janson, J. L. 1897; Laulanié, B. P. 1886c; Macklin, M. T. 1923; Morgan, T. H. 1919a; Nonidez, J. F. 1929; Parhon, C. J. & Parhon, C. 1922a; Pearl, R. & Curtis, M. R. 1909; Schott, R. G. & Curtis, V. 1928; Tichomirov, A. A. 1888; Zawadowsky, M. M. 1926a. *Lyrurus*. Nilsson, S. 1845. *Lyrurus t. tetriz*. Lönnberg, A. J. 1925c; Witherby, H. F. 1912d. *Pavo*. Nilsson, S. 1845. *Phasianidea*. Rothschild, L. W. 1928a. *Phasianus*. Bateson, W. & Thomas, R. H. 1917; Pycraft, W. P. 1911a; Anon. 1915b. *Pipilo*. Jeffries, J. A. 1883e. *Pyrrhula*. Cabanis, J. L. 1874; Poll, H. 1909. *Pyrrhula coccinea*. Tichomirov, A. A. 1918. *Pyrrhula p. pyrrhula*. Neunzig, R. 1924a, b. *Ruticilla phoenicurus*. Tschusi zu Schmidhoffen, V. 1886a. *Struthio*. Elley, S. 1910. *Tetrao*. Loudon, H. 1907; Lucanus, F. K. 1918. *Tetrao u. urogallus*. Leverkühn, P. 1889a; Nilsson, S. 1845.

Endocrine basis of sex. Includes birds. Goldschmidt, R. 1917.

External sex characters and internal reproductive organs described. *Gallus*. *Boring, A. M. & Pearl, R. 1918.

Lack of antagonism of gonads. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1925e, 1926a.

EXPERIMENTAL STUDIES

General. Pézard, A. 1920b. Includes birds. Steinbacher, G. 1930. *Galli*. Pézard, A. 1922c, d. *Gallus*. Caridroit, F. 1929; *Domm, L. V. 1929b, 1930c, 1931a; Pézard, A., Sand, K., & Caridroit, F. 1924b, d, 1925b, e, 1926c; Reagan, F. P. 1918. Includes *Gallus*. *Zawadowsky, M. M. 1929.

Castration experiments

General. *Gallus*. Benoit, Jacques 1926e, 1927a.

Gonad removal. *Gallus*. Pézard, A. & Caridroit, F. 1927c; Zawadowsky, M. M. 1927. *Meleagris*. van Oordt, G. J. & Maas, C. J. 1929. *Phasianus*. Yarrell, W. 1827b. *Pyrrhula*. Hachlow, W. A. 1927.

Ovariectomy. *Gallus*. Benoit, Jacques 1924g; Domm, L. V. 1927a, 1929b, 1931c.

Results of castration and grafting into male. *Gallus*. *Goodale, H. D. 1914, 1918a.

Sex dimorphism in castration experiments. *Anatidae*. *Goodale, H. D. 1910b.

Treading and brooding instincts present in castrated males. *Gallus*. Goodale, H. D. 1916d.

Gonad grafting experiments

See also under **Grafts**.

General. Includes *Gallus*. Steinach, E. 1919a.

Ovary grafts. *Gallus*. Caridroit, F. & Pézard, A. 1925.

Latent period in testis transplantation. *Gallus*. Pézard, A. 1921c.

HERMAPHRODITISM

General. Grassl, —. 1920. *Gallus*. Berner, O. 1925; *Hartmann, C. G. & Hamilton, W. F. 1922; Pézard, A. & Caridroit, F. 1923; Shattock, S. G. & Seligmann, C. G. 1903, 1906, 1907. Hermaphrodite figured. *Gallus*. Thompson, W. C. & Dodson, L. S. 1922. *Pyrrhula*. Lorenz, T. K. 1894a.

Either two functional gonads or ovarian disease. *Gallus*. Crew, F. A. 1925b.

Experimental. Histology of gonads. *Gallus*. Benoit, Jacques 1927c.

Hermaphroditism rudimentary in cock. *Gallus*. Fauré, C. 1919.

Histology of gonads. *Gallus*. Berner, O. 1924.

Laid eggs and crowed; also would tread hens. *Gallus*. Dent, O. F. 1917.

Pseudohermaphroditism. *Gallus*. Baraldi, G. 1897.

Right ovary and left testis. *Phasianus*. Büttikofer, J. 1896.

Rudimentary oviduct on left side in adult male. *Sturnus vulgaris*. Kummerlöwe, H. & Froböse, H. 1930.

Rudimentary testicle in female chick. *Gallus*. Benoit, Jacques 1924e.

Testes and ovary in same individual. Salerne, F. 1762.

Gynandromorphism

Characters of both sexes found in same individual with external lateral asymmetry. Testes on right and ovary on left.

Book. Text in German. Includes birds. Goldschmidt, R. 1931.

General. *Kummerlöwe, H. 1930a, 1931b; Reichenow, A. 1905. Include birds. Crew, F. A. 1926a; Goldschmidt, R. 1927; van Oordt, G. J. 1931.

Alcedo. Koenig, A. F. 1898. *Colaptes*. Cabanis, J. L. 1874. *Columba*. Kummerlöwe, H. 1930b. *Dacnis*. Kniesche, G. 1914. *Eclectus roratus*. Rothschild, L. W. 1902. *Fringilla coelebs*. Blaauw, F. E. 1890a; Rosenberg, C. B. 1884; Weber, M. W. 1890. *Gallus*. Benoit, Jacques 1926a, g; Lillie, F. R. 1932a; Moszkowicz, L. & Kolmer, W. A. 1931; Murisier, P. 1921, 1925, 1928; Pézard, A. & Caridroit, F. 1923; Shattock, S. G. & Seligmann, C. G. 1907; Skriabina, K. 1907c. *Passer*. Kummerlöwe, H. 1930b. *Phasianidae*. Rothschild, L. W. 1928a. *Phasianus*. Bond, C. J. 1913, 1914; Büttikofer, J. 1896. *Poëphila gouldiae*. Stresemann, E. 1927c. *Pyrhula*. Cabanis, J. L. 1874; Heinroth, O. 1909b; Lorenz, T. K. 1894a; Neunzig, R. 1924b; Ognev, I. F. & Ognev, S. I. 1924; Poll, H. 1909; Rothschild, L. W. 1928a. *Tichomirov*, A. A. 1918. *Tinnunculus naumanni*. Picchi, C. 1911a.

Anatomy of specimen. *Gallus*. Macklin, M. T. 1923.

Causes. Lillie, F. R. 1931. *Fringilla coelebs* & *Pyrhula pyrrhula*. Zawadowsky, M. M. 1926f.

Effect on plumage color. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1923d.

Lateral gynandromorphism. *Pyrhula pyrrhula europaea*. Heinroth, O. 1909b.

Law of "all or none." *Galli*. Pézard, A. 1922a.

Mosaic gynandromorphism. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1924k.

Periodic gynandromorphism. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1925c, 1926f.

Skin color. *Gallus*. Hutt, F. B. 1929a.

Experimental studies of gynandromorphism

General. Pézard, A. 1922c, d, 1923a. *Erythromelana*. Pézard, A., Sand, K., & Caridroit, F. 1923d. *Gallus*. Freud, J. S., Jongh, E., & Laqueur, E. 1930; Pézard, A. 1925a, 1928; Pézard, A. & Caridroit, F. 1927b; Pézard, A., Sand, K., & Caridroit, F. 1923b, c, d, 1924d, g, i, 1925c, f.

Effects on plumage. Pézard, A. & Caridroit, F. 1926.

Effect on race characters. Pézard, A., Sand, K., & Caridroit, F. 1924g.

Endocrine effects

General. Pézard, A., Sand, K., & Caridroit, F. 1924k, 1925a.

Injection of antiovarian serum. "Sérum antiovaire" and its effect on plumage of male. *Gallus*. Cotte, J. 1924.

REVERSAL OF SEX

Books. Text in English. Includes birds. Brambell, F. W. 1930. *Pavo*. Hunter, J. 1786.

Text in German. *Gallus*. Gockel, E. 1697.

Text in German and Slavic. Includes *Gallus*. Zawadowsky, M. M. 1922.

General. Blanchard, R. 1916; Brandt, A. F. 1889a; Cosmao, G. 1924; Cronau, C. 1900; Gillespie, T. H. 1922; Heminger, I. M. 1925; Meyer, A. B. 1894a; Parkes, A. S. & Brambell, F. W. 1926; Pézard, A., Sand, K., & Caridroit, F. 1925b, 1926h; Poll, H. 1913; Tschusi zu Schmidhoffen, V. 1875, 1876, 1883. Include birds. Stephan, P. 1902; van Oordt, G. J. 1931. Birds incidental. Brambell, F. W. 1923.

Anas. Nilsson, S. 1845; Rogat, L. 1859; Willey, A. 1891; Yarrell, W. 1857. *Anas boschas*. White, T. 1888. *Anas platyrhynchos*. Lönnerberg, A. J. 1926b. *Columba*. Flower, J. 1879c; Ramé, E. 1903; Riddle, O. 1923a, 1924a. *Dryobates major pinetorum*. Stresemann, E. 1923e. *Emberiza*. Flower, J. 1879c. *Emberiza canneti*. Schiebel, G. 1910. *Erithacus*. Tschusi zu Schmidhoffen, V. 1919. Gallinae. Larcher, O. 1916. *Gallus*. Caridroit, F. 1927; Crew, F. A. 1923a, 1923b; Davaine, C. J. 1865; Dent, O. F. 1917; *Fell, H. B. 1923; Kuhn, O. 1927; Lillie, F. R. 1927; Mercier, L. & Poisson, R. 1926b; Meyer, R. 1866; Murisier, P. 1922-23, 1925, 1928; Ramé, E. 1903; Reed, F. D. & Martin, C. L. 1933; Shurtleff, N. B. 1866; Skriabina, K. 1911a; Zawadowsky, M. M. & Zubina, E. M. 1929a. *Lamprolaima*. Seth-Smith, D. 1913c. *Loxia*. Tandy, E. 1889. *Lyrurus t. tetriz*. Herr, O. 1926; Nilsson, S. 1845; Schäff, E. A. 1889a; Schlegel, R. 1901; Tobias, R. 1854; Wiebke, P. M. 1885; Witherby, H. F. 1912d; Zollikofer, E. H. 1893b. *Mareca penelope*. Ogilvie-Grant, W. R. 1914a. *Otis tarda*. Schlegel, R. 1899. *Pavo*. Nilsson, S. 1845; Putnam, F. W. 1865. *Phasianus*. Smith, G. & Thomas, R. H. 1913; Witherby, H. F. 1912d. *Phasianus colchicus*. Flower, J. 1879a; Montagu, E. S. 1908; Schlegel, R. 1899. *Phasianus colchicus* × *P. torquatus*. Millais, J. G. 1911a. *Phoenicurus p. phoenicurus*. Nicoll, M. J. 1911. *Piranga rubra*. Shufeldt, R. W. 1891a. *Pyrhula pyrrhula*. Ognev, I. F. & Ognev, S. I. 1924. *Sericulus*. Philipps, R. 1907. *Tetrao*. Flower, J. 1879c. *Tetrao tetriz*. Millais, J. G. 1910b; Ogilvie-Grant, W. R. 1911a; Schlegel, R. 1899; Ståhlberg, B. 1904. *Tetrao urogallus*. Nilsson, S. 1845; Ståhlberg, B. 1904; Zollikofer, E. H. 1893c. Tetraonidae. Olsen, O. 1913. *Tinnunculus tinnunculus*. Schlegel, R. 1899.

Cytological study. *Gallus*. Caridroit, F. 1927.

Histology of gonads. *Columba*. Brambell, F. W. & Marrian, G. F. 1929.

Hyperthyroidism as cause. *Gallus*. Nevalonny, M. 1927a.

Lateral hemihypertrophy. Causes. Lillie, F. R. 1931.

Modifications of spurs and plumage. Galli. Pézard, A. 1922a.

Ovo-testes. Development. *Gallus*. Krediet, G. 1927.

Reproductive organs described. *Gallus*. Boring, A. M. & Pearl, R. 1918.

Sex dimorphism. Many species. Goodale, H. D. 1924c.

Sexuality of right ovary. Riddle, O. 1925c.

Skin graft and feathers. *Gallus*. Danforth, C. H. 1929b.

Varieties and causes. Larcher, O. E. 1917.

Acquirement of female plumage by male

General. *Gallus*. Tegetmeier, W. B. 1861. *Lyrurus* & *Phasianus*. Millais, J. G. & Pycraft, W. P. 1911a. *Ruticilla tithys*. Tschusi zu Schmidhoffen, V. R. 1887.

Thyroid gland pathological. Testis contained luteal cells. *Gallus*. Buchanan, G. 1926.

Tuberculosis as cause. *Gallus*. Milojevic, B. D. 1921.

Arrhenoidy

Female taking on external characters of male. Pathology of ovary commonly present.

Book. Text in English. *Pavo*. Hunter, J. 1786.

General. Arrigoni degli Oddi, E. 1887a; Bergtold, W. H. 1916c; Brandt, A. F. 1889a; Bruhin, T. A. 1869; Cuénot, L. 1900b; Gurney, J. H. Jr. 1888, 1894b; Wurm, W. 1899c.

Aix sponsa. Finn, F. 1916. *Anas*. Caridroit, F. & Pézard, A. 1927; Corbin, G. B. 1902b; Landois, H. 1877a, 1889. Anatidae. Gurney, J. H. 1883; Gurney, J. H. Jr. 1894a; La Fresnaye, F. 1849. *Columba*. Guyer, M. F. 1899. *Cyanecula*. Averin, V. G. 1912b. *Emberiza*. Bureau, L. 1877b. Gallinae. Larcher, O. 1916. *Gallus*. Berner, O. 1923, 1928; Bonnier, G. 1928a; Dehne, A. 1856; Engelmann, F. 1914-15; Gatenby, J. B. & Brambell, F. W. 1924; Green, —. 1836; Holländer, E. 1918; Labbe, E. H. 1920; Landois, H. 1889; Parkes, A. S. & Brambell, F. W. 1926. *Mergus*. Coburn, F. 1893. *Passer*. Arrigoni degli Oddi, E. 1887a. *Passerina*. Bureau, L. 1877b. *Phasianus*. Geoffroy Saint-Hilaire, I. 1825, 1841; Hamilton, E. 1862; Hunter, J. 1780; Labbe, E. H. 1920; Yarrell, W. 1827b;

Zawadowsky, M. M. & Zubina, E. M. 1928. *Phasianus colchicus*. Witherby, W. F. 1912d. *Saxicola*. Bedford, M. 1912. *Struthio*. FitzSimons, F. W. 1912. *Tetrao*. Engelmann, F. 1914-15; Fatio, V. 1869b; Hamilton, E. 1862. *Tetrao tetrix urogallus*. Eder, R. 1910; Lorenz, T. K. 1891, 1894b; Loudon, H. 1907. *Tetrao* hybrids. Lucanus, F. K. 1918.

Fertility retained. *Fringilla coelebs*. Studnitz, G. 1926. *Gallus*. Crew, F. A. 1927c; Homeyer, A. 1868a.

Spurs present. *Phasianus*. Hunter, J. 1780.

Causes of sex reversal

Atrophy of ovary. *Gallus*. Maynard, C. J. 1896a. *Lyrurus t. tetrix*. Millais, J. G. 1910b; Wiebke, P. M. 1885. *Tetrao urogallus*. Smith, J. A. 1863d.

Disease or injury. Rothschild, L. W. 1912.

Histology of atrophied ovaries. *Phasianidae*. Zawadowsky, M. M. & Zubina, E. M. 1929b.

Ovarian disease and degeneration. *Gallus*. Tegetmeier, W. B. 1857; Turner, W. 1865; Yarrell, W. 1831b. *Phasianus*. Tegetmeier, W. B. 1857. *Tetrao u. urogallus*. Smith, J. A. 1863d.

Ovarian tumor. *Gallus*. Berner, O. 1926.

Senile ovary. Caridroit, F. & Pézard, A. 1927.

Experimental studies of sex reversal

General. *Gallus*. Caridroit, F. 1926, 1927, 1929; Pézard, A., Sand, K., & Caridroit, F. 1924b, c.

Castration. *Gallus*. Benoit, Jacques 1924a, 1926b; Morgan, T. H. 1915; Pézard, A., Sand, K., & Caridroit, F. 1923a.

Effect of implantation of ovarian tissue from normal bird. *Gallus*. Cole, L. J. & Lippincott, W. A. 1919.

Experimental transplantation of gonad. *Gallus*. Roxas, H. A. 1926.

Female plumage induced in male by feeding thyroid. *Gallus*. Horning, B. & Torrey, H. B. 1923.

Gonadotropic hormone effects. *Pyromelana franciscana*. Witschi, E. 1936.

Histological study of experimental sex reversal of gonads. *Gallus*. Benoit, Jacques 1927c.

Injection of drugs. *Gallus*. Bielchen, E. O. 1922.

Ovariectomy

General. *Gallus*. Benoit, Jacques 1923a, i, 1924f, g, 1926d; Domm, L. V. 1924, 1927a, b, 1928a, 1929b; Goodale, H. D. 1916c; Mercier, L. & Poisson, R. 1926b; Pézard, A. & Caridroit, F. 1927a; Pézard, A., Sand, K., & Caridroit, F. 1926g; Zawadowsky, M. M. 1926b. *Phasianus*. Yarrell, W. 1827b.

Assumption of male plumage. *Anas*. Goodale, H. D. 1912.

Development of testes-like organs. *Gallus*. Benoit, Jacques 1923c.

Interstitial tissue. *Gallus*. Benoit, Jacques 1926c, d.

Production of right ovo-testes. *Gallus*. Bonnier, G. 1928b.

Reversal of sex by testis grafts in ovariectomized fowl. *Gallus*. *Appel, F. W. 1929.

Rudimentary right ovary developed in testes. *Gallus*. Benoit, Jacques 1927a.

Sex potentiality in transplanted ovary. *Gallus*. Pézard, A., Sand, K., & Caridroit, F. 1924b.

Spermatogenesis after ovariectomy. *Gallus*. Domm, L. V. 1929b.

SECONDARY SEX CHARACTERS

Books. Text in English. Dixon, C. 1897a. *Gallus*. Punnett, R. C. 1923.

General. Butler, A. G. 1900b; Guyénot, E. 1912; Lowe, P. R. 1915a; McGee, L. C., Juhn, M., & Domm, L. V. 1928; Mottram, J. C. 1915; Sapošnikov, C. 1915. Include birds. Frisch, J. L. 1776; Ohler, K. W. 1905.

Columba. Iwata, I. 1924, 1926. *Cuculus saturatus*. Kawaguchi, M. 1919. *Erismatura jamaicensis*. Wetmore, A. 1917b, 1918a, d. *Galli*. Pézard, A. 1924a. *Gallus*. Cole, L. J. & Lippincott, W. A. 1919; Hartman, C. G. & Hamilton, W. F. 1922; Morgan, T. H. 1919a; Pézard, A. 1911c, 1923a, 1925a. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Phainopepla nitens*. Miller, A. H. 1933. *Phasianus*. Pézard, A. 1923a; Régnier, M. V. 1926b. *Tetraonidae*. Olsen, O. 1913. *Turtur* [*Streptopelia*] *risorius*. Yerkes, R. M. 1915.

Bulla ossea. *Anas punctata*. Newton, A. 1871.

- Cell types of hypophysis. *Turdus merula*. Schildmacher, H. 1937a.
- Changes. *Anas* & *Cairina*. Poll, H. 1909. *Gallus*. Poll, H. 1909; Portier, P. & Rorthays, R. 1921. *Netta*. Poll, H. 1909.
- Comb size. *Gallus*. Greenwood, A. W. & Crew, F. A. 1927.
- Development. Kammerer, P. 1912. Includes birds. Riddle, O. 1931a. *Anas*. Zawadowsky, M. 1926. *Columba*. *Ghigi, A. 1908d. *Gallus*. Thomsen, E. 1911; Zawadowsky, M. 1926; Zawadowsky, M. M. 1922, 1926g. *Gennaenus*. *Ghigi, A. 1908d. *Phasianus*. Zawadowsky, M. 1926.
- Evolution of ornamental secondary sex characters. Lameeré, A. 1904.
- Fat and phosphorus content of blood. *Gallus*. Lawrence, J. V. & Riddle, O. 1916.
- Fleshy appendages of head. *Cerionis*. Bartlett, A. D. 1864.
- Interstitial cells of testis. Significance. *Fringilla*, *Passer*, & *Sturnus*. Mazza, F. 1924.
- Mental inferiority of female sex. Snell, F. H. 1858.
- Migrations, sex differences in. Helm, A. F. 1903, 1904.
- Origin of secondary sex characters. Raptore. Schmidt-Bey, W. 1913.
- Ossification. Sex differences. *Gallus*. Schroeder, C. H. 1933.
- Pelvis. Psittacidae. Knobel, E. M. 1924.
- Periodic modification. Galli. Pézard, A. 1922b.
- Pituitary gland size and intestinal length in doves and pigeons. Columbidae. Riddle, O. & Nussmann, T. C. 1933. *Streptopelia*. Riddle, O. & Flemion, F. 1928a.
- Proportions of cortex and medulla in suprarenals. *Gallus*. Sauer, F. C. & Latimer, H. B. 1931.
- Proteins. Includes *Gallus*. Tado-koro, M. A. & Watanabe, S. 1927.
- Seasonal control. *Passer*. Witschi, E. 1935.
- Similarity of males in certain allied species, females being different. Hellmayr, C. E. 1929c.
- Visceral topography. *Gallus*. Latimer, H. B. & Osborn, J. L. 1923.
- Weights of liver and spleen. *Streptopelia*. Riddle, O. 1928a.
- Wing. *Passer*. Butler, A. G. 1900a.

PLUMAGE

General. Gerbe, Z. 1838; Headley, F. C. 1893. *Carpodacus*. Grinnell, J. 1911a. *Eclectus*. Meyer, A. B. 1893. *Ixoreus*. Law, J. E. 1931. *Nephoecetes niger borealis*. Swarth, H. S. 1912a.

Barring factor. *Gallus*. Goodale, H. D. 1909.

Determination when interstitial cells appear. *Gallus*. Cilleuls, J. 1912.

Nestling plumage. *Pyrhula*. Gloeden, B. 1876b.

Nuptial plumes. *Botaurus*. *Brewster, W. 1911a.

Wing feathers. Degen, E. 1900.

Experimental studies

General. *Gallus*. Michalovsky, J. 1927; Pézard, A., Sand, K., & Caridroit, F. 1924i, 1925b, d, e.

Comb size in relation to quantity of testicular tissue. *Gallus*. Benoit, Jacques 1927h.

Experimental lesions in visual apparatus. Effects on secondary sex characters and testes function. *Gallus*. Ceni, C. 1922.

Female characters assumed when ovary was transplanted into capon. *Gallus*. Domm, L. V. 1928c.

Gonad grafting and its effects upon plumage, in ovariectomized hen. *Gallus*. Greenwood, A. W. & Crew, F. A. 1926.

Inanition and its effects. *Gallus*. Martino, G. 1926b.

Ovariectomy and its effects. *Gallus*. Domm, L. V. 1924, 1927a, b, 1928a.

Physiological conditioning. Pézard, A. 1918.

Precocious development. Hypophyseal implants. *Gallus*. Domm, L. V. 1931b.

Sunshine and lack of sunshine with wattles and combs removed. Buckner,

G. D., Insko, W. M., & Martin, J. H. 1933.

Testes grafting. Effects on sex characters. *Gallus*. Gelei, J. 1924; Pézard, A. 1911c.

Thyroid feeding. Effects. *Gallus*. Cole, L. J. & Hutt, F. B. 1927-28; Crew, F. A. 1925c; Schwarz, E. 1931; Torrey, H. B. & Horning, B. 1925c.

Yolk injection in *Gallus*. Kopeć, S. & Greenwood, A. W. 1930.

EFFECTS OF CASTRATION

General. Berner, O. 1922. *Anas*. Goodale, H. D. 1916c. *Gallus*. Foges, A. 1898, 1903; Goodale, H. D. 1913a, 1916c; Greenwood, A. W. 1928; Pézard, A. 1911c. *Meleagris*. Athias, M. 1928. *Pyromelana franciscana*. Witschi, E. 1936.

Plumage of foot in offspring. *Columba* & *Gallus*. Bond, C. J. 1913, 1914.

Reduction of

Comb. Dönhoff, E. 1876a.

Testicular parenchyma and its effect on comb. *Gallus*. Benoit, Jacques 1927f.

EFFECTS OF THYROIDECTOMY

General. Greenwood, A. W. & Blyth, J. S. 1927.

Hen-feathering. Crew, F. A. 1927a.

SEX HORMONES

Book. Text in English. Includes birds. Hoskins, R. G. 1922.

General. Barnabo, V. 1906; Blanchard, R. A. 1916; Pézard, A. 1913c, 1918, 1923a. Include birds. Bouin, P. & Ancel, P. 1924; Steinach, E. 1919b; van Oordt, G. J. 1931.

Anas. Zawadowsky, M. 1926. *Fringilla*. Mazza, F. 1924. *Galli*. Pézard, A. 1924a. *Gallus*. Bulliard, H. & Champy, C. 1927; *Caridroit, F. 1926; Cuénot, L. 1923; Finlay, G. F. 1925; Goodale, H. D. 1914; Greenwood, A. W. 1928; Kuhn, O. 1928a; Masui, K. 1930; Michalovsky, J. 1927; Morgan, T. H. 1919a; Pézard, A. 1911c, 1927a, b; Pézard, A. & Caridroit, F. 1927b; Pézard, A., Sand, K., & Caridroit, F. 1924b, c, d, e, f, g, h, i, j, k, l, 1925a, b, d, e, f, 1926a, b, c, e, g; Racah, M. 1922; Smith, G. 1906; Zawadowsky, M.

1926; Zawadowsky, M. M. 1926b, 1928. Includes *Gallus*. Wehefritz, E. & Gierhake, E. 1930. *Gennaeus*. Cuénot, L. 1923. *Passer*. Mazza, F. 1924; Witschi, E. 1935. *Phasianus*. Zawadowsky, M. 1926. *Streptopelia*. Riddle, O. 1931b. *Sturnus*. Mazza, F. 1924.

"All or none" law. *Gallus*. Pézard, A. 1921a.

Gynandromorph. *Gallus*. Macklin, M. T. 1923.

Hermaphrodite. *Gallus*. Berner, O. 1924.

Hyperthyroidism. Effects. *Gallus*. Zawadowsky, B. M. 1927.

Inhibitor of male plumage. Probable origin in interstitial tissue. *Gallus*. Benoit, Jacques 1927i.

Metabolism. Effects. *Gallus*. Szuman, J. G. 1926b.

Origin. Benoit, Jacques 1926c.

Pigment formation in skin. *Casuaris*. Hasskó, A. 1929b.

Quantitative action. *Gallus*. Benoit, Jacques 1928a.

Red blood corpuscle number and percentage of hemoglobin. *Gallus*. Blacher, L. J. 1926a, b.

Relation to nervous energy. Athanasiasu, I. & Pézard, A. 1924.

Sex hormones in eggs. Fellner, O. 1925.

Simultaneous injection of male and female sex hormones into capons. *Gallus*. Juhn, M., d'Amour, F. E., & Womack, E. B. 1930.

Somatic cells. *Gallus*. Field, G. W. 1901b.

Suppression of cock-feathering in Sebright male and in hens of all fowl. *Gallus*. Boring, A. M. & Morgan, T. H. 1918.

Threshold. *Gallus*. Pézard, A. & Caridroit, F. 1927b; Pézard, A., Sand, K., & Caridroit, F. 1925d, f.

EFFECTS OF CASTRATION

General. *Anas*. Goodale, H. D. 1910b. *Gallus*. Pellegrini, G. 1927; Pézard, A. 1920c. *Meleagris*. Athias, M. 1928.

Nervous motor energy. *Gallus*. Athanasiasu, I. & Pézard, A. 1924.

On secondary sex characters

General. Benoit, Jacques 1924c.

Comb size. *Gallus*. Benoit, Jacques 1926a; Greenwood, A. W. & Crew, F. A. 1927.

Grafting testicular tissue into castrated male resulted in resumption of normal function of erectile organs, but did not affect secondary sex characters. *Gallus*. Pézard, A. 1911c.

Influence on plumage. *Columba*. Lipschütz, A. & Wilhelm, O. 1929.

Effects of sex hormones on

Cyclical growth of seminal vesicles. Riddle, O. 1927a.

Development. *Anas*, *Gallus*, & *Phasianus*. Zawadowsky, M. M. 1926c, g.

Egg formation. *Gallus*. Asmundson, V. S. 1931.

Endocrine action of right gonad in female. *Gallus*. Gray, J. C. 1930.

Growth. Pézard, A. 1919b.

Sex behavior. *Columba*. Riddle, O. 1914b.

SECONDARY SEX CHARACTERS

General. *Benoit, Jacques 1929a; Bond, C. J. 1913, 1914; Goodale, H. D. 1913b.

Anas. Yarrell, W. 1857. *Anser*. Lipschütz, A. 1923. *Gallus*. Mazzetti, L. 1911. Galli. Pézard, A. 1915, 1922b; Hanau, A. 1897; Kemp, T. 1925; Pézard, A. 1911b; Pézard, A., Sand, K., & Caridroit, F. 1924e; Walker, C. E. 1908. *Phasianus*. Pézard, A. 1911b.

Head appendages

Growth. *Gallus*. Domm, L. V. 1930b.

Comb

General. *Gallus*. Champy, C. 1926; Champy, C. & Kritch, N. 1925b; Hardesty, M. 1931.

Growth. *Gallus*. Smith, G. 1911.

Histology. Gallinae. Champy, C. & Kritch, N. 1926.

Male hormone. Effect on development. *Gallus*. Benoit, Jacques 1927b; Smith, A. J. & Crocker, W. J. 1913.

Plumage

General. Freud, J. S., Jongh, E., & Laqueur, E. 1930; Eliot, T. S. 1928;

Greenwood, A. W. 1928; Greenwood, A. W. & Blyth, J. S. 1929; Pézard, A., Sand, K., & Caridroit, F. 1923b, d, 1924i, 1925f.

Eclipse plumage. *Anas boschas*. Seligmann, C. G. & Shattock, S. G. 1914.

Injection. Effects on color pattern. *Gallus*. *Juhn, M., Faulkner, G. H., & Gustavson, R. G. 1931.

Regenerating feathers. *Pyromelana franciscana*. Witschi, E. 1936.

Female sex hormones

General. *Columba*. Riddle, O. & Tange, M. 1926, 1928b. *Gallus*. Allen, E. and others 1924; Loewe, S., Voss, H. E., & Paas, E. 1927.

Capon feathers. *Gallus*. Juhn, M. & Gustavson, R. G. 1930a.

Development of feathers. *Gallus*. *Lillie, F. R. & Juhn, M. 1932.

Experimental embryology, use in. *Gallus*. Lienhart, R. 1927.

Migration impulse, effects on. Schildmacher, H. 1933.

Plumage, effects on. *Gallus*. Juhn, M., d'Amour, F. E., & Gustavson, R. G. 1930. *Gallus* & *Gennaeus*. Freud, J. S., Jongh, E., & Laqueur, E. 1930.

Restrict migratory impulse. Giersberg, H. & Stadie, R. 1934.

PLACENTAL HORMONES INJECTED

Effects. *Gallus*. Juhn, M. & Gustavson, R. G. 1930b. *Streptopelia*. Riddle, O. & Tange, M. 1928b.

Endocrine function of right gonad of hen. *Gallus*. Gray, J. C. 1930.

Oviduct, effects on. *Gallus*. Juhn, M. & Gustavson, R. G. 1928.

Male sex hormones

General. Pézard, A. 1911c, 1913c. Columbidae. Riddle, O. 1925a. *Phainopepla nitens*. Miller, A. H. 1933. *Sturnus*. Bissonnette, T. H. & Chapnick, M. H. 1930.

Action of testes extract on comb. *Gallus*. Smith, A. J. & Crocker, W. J. 1913.

"All or none" law. Since discarded. Pézard, A. 1921a, b, 1922a.

Castration experiments. *Gallus*. Benoit, Jacques 1927g.

Effect of male sex hormone upon color of plumage, beak, and feet. *Larus ridibundus*. van Oordt, G. J. & Junge, G. C. 1930.

Immature bird. *Gallus*. Benoit, Jacques 1924d.

Male hormone in blood of cock. *Gallus*. Caridroit, F. & Pézard, A. 1926.

Origin, nature, and role of testicular secretions. *Passer* & *Serinus*. Loisel, G. 1902c.

Role of interstitial tissue. *Anser*. Lipschütz, A. 1923. *Gallus*. Benoit, Jacques 1928b; Goodale, H. D. 1919d.

Testes change. Effects. Anatidae. Parhon, C. J. & Parhon, C. 1922b.

Transplantation of testes and its effects. *Gallus*. Gelei, J. 1924; Pézard, A. 1911c.

Ovariectomy, effects of

General. *Gallus*. Pézard, A. 1915.

Bilateral ovariectomy. *Gallus*. *Domm, L. V. 1929a.

Equivalent potencies of testis-like gonads in ovariectomized fowl. *Domm, L. V. 1931a.

Growth of spurs and comb. *Gallus*. Pézard, A. 1914, 1915.

Spur dichotomy in ovariectomized fowl. *Gallus*. Domm, L. V. 1931c.

SEX RATIO

Book. Text in English. *Colinus*. Stoddard, H. L. 1931.

General. Heinroth, O. 1912c; Lario-nov, W. T. 1927; Lucanus, F. K. 1917. Includes birds. Düsing, K. 1884.

Anatidae. Boase, H. 1926c; Furniss, O. C. 1935. *Arenaria i. interpres* & *Calidris canutus*. van Oordt, G. J. 1928. *Columbae*. Cole, L. J. 1911; Cole, L. J. & Kirkpatrick, W. F. 1915. *Cuculus*. Sarasin, P. 1924. *Gallus*. Jull, M. A. 1931a; Lambert, W. V. & Curtis, V. 1929; Mussehl, F. E. 1924; Pearl, R. 1917b, e. *Perdix*. Diezel, C. E. 1855. *Topaza pella*. Nicholson, E. M. 1931b.

Experimental modification by inanition. *Gallus*. Field, G. W. 1901a.

Hybrids. Poll, H. 1921. *Anas*. Phillips, J. C. 1914c. *Phasianus*. Thomas, R. H. & Huxley, J. S. 1927.

Random in a clutch of eggs. *Columba*. Cuénot, L. 1900a.

Factors influencing sex ratio

General. *Gallus*. Pearl, R. 1917b. *Serinus*. Heape, W. 1907.

Genetics of sex ratio. *Gallus*. Jull, M. A. 1932a; Lambert, W. V. & Knox, C. W. 1926.

Inequality. *Nyrocinæ*. Robinson, H. W. 1913d.

Population. *Arenaria i. interpres* & *Calidris canutus*. van Oordt, G. J. 1928.

Stale sperm. *Streptopelia*. Riddle, O. & Behre, E. H. 1921a.

CORRELATIONS WITH

Antecedent egg production. *Gallus*. Callenbach, E. W. 1929; Jull, M. A. 1924b.

Fecundity. *Gallus*. Jull, M. A. 1931b.

No correlation with testicular asymmetry. Friedmann, H. 1927c.

SEXUAL SELECTION

See also under Evolution.

Books. Text in English. Include birds. Darwin, C. R. 1871; Poulton, E. B. 1890; *Wallace, A. R. 1878.

General. Allen, J. A. 1885; Finn, F. 1912; Howard, H. E. 1903; Ischreyt, G. 1898; Kleinschmidt, O. 1925; Murray, A. 1868; Selous, E. 1907, 1908a; *Wallace, A. R. 1890; Zitkov, B. M. 1910. Includes birds. Lameeré, A. 1904.

Colaptes. Noble, G. K. 1936. *Gallus*. Morgan, T. H. 1919a. *Machetes pugnax*. Selous, E. 1906-07. *Melospitacus*. Cinat-Tomson, H. 1926, 1927. *Melospiza melodia beata*. Nice, M. M. 1933c. *Numida*. Finn, F. 1902b. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Paradisaea*. Marshall, W. A. 1871. *Podiceps c. cristatus*. *Huxley, J. S. 1914.

Effects on feather structure. Rensch, B. 1927b.

Relation to song. Hawkins, C. J. 1918, 1920.

SKELETON

See also under Ossification, Paleontology, and Skull.

Books. Text in Danish. Heilmann, G. 1916a.

Text in Dutch. Includes birds. Man, J. G. 1873.

Text in English. Coues, E. B. 1877; *Eyton, T. C. 1867-75; Owen, R. 1835-36, 1866-68; Yarrell, W. 1837-43. Many species. Parker, T. J. & Haswell, W. A. 1897. Includes birds. Huxley, T. H. 1871. *Apteryx*. Owen, R. 1879. *Aquila*. MacGillivray, W. 1837-52. Includes *Gallus*. Reynolds, S. H. 1897. *Lagopus*. Lovat, S. J. and others 1911.

Text in French. Belon du Mans, P. 1555; Cuvier, G. L. 1805; Daudin, F. M. 1800. Many species. Milne-Edwards, A. & Grandidier, A. 1879-81. Includes birds. Geoffroy St. Hilaire, E. 1818a. *Aquila*. *Milne-Edwards, A. 1867-71. *Didus*. Gervais, F. L. 1867-69.

Text in German. Gadow, H. F. 1891d; Lucanus, F. K. 1925; Nitzsch, C. L. 1811; Pander, C. H. & Alton, E. 1827; Prechtl, J. J. 1846; Reichenow, A. 1913; Schmidt, M. 1867; Tiedemann, F. 1810-14. Many species. Meyer, A. B. 1879-97. Include birds. Camper, P. 1793; Carus, C. G. 1828. Falconiformes. Alton, J. S. 1827.

Text in Latin. Borelli, G. A. 1685; Coiter, V. 1575.

General. *Boas, J. E. 1929; Brandt, J. F. 1840a, c; *Fürbringer, M. 1885a, 1888; Gadow, H. F. 1877b; Geoffroy St. Hilaire, E. 1838; Ghigi, A. 1914d; Huxley, T. H. 1867; Lydekker, R. 1879; Oken, L. 1823; Röttiger, A. 1876a; Steinmann, G. 1922; Vieq d'Azyr, F. 1776-78; Wetmore, A. 1919a. Many species. Camper, P. 1878; Hoeven, J. 1867; *Knopfli, W. 1919; Nitzsch, C. L. 1853; Reichenow, A. 1877b; Shufeldt, R. W. 1888h, 1895; van Oort, E. D. 1907. Include birds. Alix, H. E. 1867, 1874b; Baur, G. H. 1885d, f; Blanchard, C. E. 1859; Huxley, T. H. 1868a; Laurencet, —. 1829; Parker, W. K. 1880; Poelman, C. 1853; Seeley, H. G. 1866. Birds incidental. Baer, R. E. 1826; Claus, C. F. 1876; Martins, C. F. 1857b; Rouget, C. 1860. Arctic and sub-arctic water birds. Shufeldt, R. W. 1888a. Water birds. Coues, E. B. 1869b; Dablow, A. 1925.

Accipitres. *Shufeldt, R. W. 1891f, 1909b. *Agriocharis ocellata*. Shufeldt, R. W. 1914b. *Alca impennis*. Blyth, E. 1837b; Fatio, V. 1869a; Lucas, F. A. 1890; Owen, R. 1866. *Alcae*. Parker, W. K. 1890; Shufeldt, R. W. 1901b. *Anas*. Steenstrup, J. J. 1872. *Anatidae*. Parker, W. K. 1890. *Anser*. Eyton, T. C. 1840; Gebhardt, F. A. 1901; Weber, M. I. 1824. *Anseres*. *Shufeldt, R. W. 1889c, 1909b. *Anthochaera carunculata*. Shufeldt, R. W. 1913c. *Anthus*. Shufeldt, R. W. 1882a. *Aphriza virgata*. Shufeldt, R. W. 1888e. *Aptenodytes patachonica*. Reid, J. 1835. *Apteryx*. Allis, T. 1873; Owen, R. 1879. *Arachnothera magna*. Shufeldt, R. W. 1909a. *Aramidae*. Shufeldt, R. W. 1916c. *Aramus*. Beddard, F. E. 1902a. *Aramus vociferus*. Shufeldt, R. W. 1915f. *Archaeopteryx*. Hurst, C. H. 1895; Jaekel, O. 1915; Lowe, P. R. 1935; Petronievics, B. 1921. *Archaeornis*. Petronievics, B. 1925. *Ardeidae*. Mitchell, P. C. 1913a. *Ardeinae*. Shufeldt, R. W. 1889f. *Balaeniceps rex*. Mitchell, P. C. 1913a; *Parker, W. K. 1860a, b, 1862b; Shufeldt, R. W. 1901a. *Bubonidae*. Shufeldt, R. W. 1900a. *Bucerotidae*. Beddard, F. E. 1889b, 1901a. *Cancroma*. Gervais, F. L. 1855. *Caprimulgidae*. Stejneger, L. H. 1886a. *Caprimulgus europaeus*. Flensburg, O. 1868. *Cariama*. Gervais, F. L. 1855. *Carpococcyx*. Beddard, F. E. 1901c. *Casuarinus*. Flower, W. H. 1871; Goette, A. W. 1877; Merrem, B. 1819. *Cathartidae*. Shufeldt, R. W. 1883a. *Cereopsis novae-hollandiae*. Shufeldt, R. W. 1913b. *Ceryle alcyon*. Shufeldt, 1884b. *Chamaea*. Lucas, F. A. 1891a. *Chauna*. Shufeldt, R. W. 1901c. *Chionis*. Eyton, T. C. 1858. *Chunga*. Beddard, F. E. 1889c. *Cinclus mexicanus*. Shufeldt, R. W. 1882a. *Circus hudsonius*. Shufeldt, R. W. 1889g. *Colius*. Murie, J. 1872d; Pycraft, W. P. 1907e. *Columba*. Müller, B. 1907; Parker, T. J. & Haswell, W. A. 1897; Shufeldt, R. W. 1901d; Weber, M. I. 1824. *Columbae*. Mitchell, P. C. 1899. *Columbidae*. Shufeldt, R. W. 1891b. *Columbiformes*. Martin, R. 1904. *Colymbus*. Coues, E. B. 1867; Högman, S. 1873. *Conophaga*. Forbes, W. A. 1881a. *Conurus carolinensis*. Shufeldt, R. W. 1886f. *Coracina*. Burmeister, H. 1856a. *Corcorax*. Shufeldt, R. W. 1923. *Corvidae*. Shufeldt, R. W. 1888f, g. *Corvus*. Bernstein, H. A. 1853. *Crex*. Giebel, C. G.

- 1855d. *Crypturiformes*. Parker, W. K. 1866a. *Crypturus*. Wagner, J. A. 1837. *Cuculidae*. Shufeldt, R. W. 1901f. *Cuculiformes*. *Pycraft, W. P. 1903c. *Cuculus canorus*. Flensburg, O. 1868; Oppel, F. M. 1858. *Cygninae*. Stejneger, L. H. 1882. *Cygnus*. Sharpless, J. F. 1832; Wiedemann, C. R. 1801. *Cypselidae*. Stejneger, L. H. 1886a. *Cypselus*. Bernstein, H. A. 1856. *Dicholophus*. Barron, C. 1857; Gadow, H. F. 1876b; Wagner, J. A. 1837. *Didunculus strigirostris*. Eudes-Deslongchamps, E. 1879; Martin, R. 1904. *Didus*. Owen, R. 1869; Strickland, H. E. & Melville, A. G. 1848; True, F. W. 1905. *Diomedea*. Shufeldt, R. W. 1889d. *Dromaeus* [*Dromiceius*]. Frémerij, P. J. 1819; Goette, A. W. 1877; Houghton, S. 1867b, c. *Ectopistes*. Shufeldt, R. W. 1914c. *Eremophila alpestris*. Shufeldt, R. W. 1881d. *Eurylaemidae*. Pycraft, W. P. 1905a. *Eurylaemus*. Garrod, A. H. 1878d; Sclater, P. L. 1872. *Eurynorhynchus*. Anderson, J. 1879b. *Falconiformes*. *Pycraft, W. P. 1902b; Sushkin, P. P. 1899a, 1900b, c, 1905. *Fratercula*. Shufeldt, R. W. 1888g. *Fregilupus varius*. Murie, J. 1874b. *Fringilla*. Giebel, C. G. 1854a. *Fulmarus*. Shufeldt, R. W. 1889d. *Galli*. Blanchard, C. E. 1857a. *Galliformes*. Parker, W. K. 1866a. *Gallinae*. Huxley, T. H. 1868b; *Shufeldt, R. W. 1909b. *Gallinago*. Beddard, F. E. 1901d. *Gallinula*. Giebel, C. G. 1855d; Hering, E. 1864. *Gallus*. *Geoffroy St. Hilaire, E. 1807; Goette, A. W. 1877; Latimer, H. B. 1923; Romer, A. S. 1927; Weber, M. I. 1824. *Gallus bankiva*. Shufeldt, R. W. 1888d. *Geococcyx*. Shufeldt, R. W. 1886g. *Geococcyx californianus*. Larson, L. M. 1930. *Grallina*. Shufeldt, R. W. 1923. *Gruiformes*. Aldrovandus, U. 1610-13; Shufeldt, R. W. 1895, 1915b. *Habia*. Shufeldt, R. W. 1888h. *Halcyones*. Shufeldt, R. W. 1903a. *Haliaeetus*. Giebel, C. G. 1865a. *Heliornis*. Beddard, F. E. 1893. *Hemipodius*. Parker, W. K. 1862a. *Herodiones*. Shufeldt, R. W. 1901h. *Hesperiphona vespertina*. Herrick, C. L. 1886. *Hesperocichla*. Shufeldt, R. W. 1882a. *Hirundinidae*. *Pycraft, W. P. 1907a. *Hirundo rustica* & *Hirundo urtica*. Flensburg, O. 1868. *Hydrophasianus chirurgus*. Shufeldt, R. W. 1919b. *Ichthyornis*. Shufeldt, R. W. 1893b. *Icteridae*. Shufeldt, R. W. 1888f. *Impennes*. *Pycraft, W. P. 1899a. *Iynx*. Fürbringer, M. 1889. *Laniidae*. *Pycraft, W. P. 1907a. *Lanius ludovicianus excubitorides*. Shufeldt, R. W. 1881e. *Lathamus*. Forbes, W. A. 1879. *Leptosoma discolor*. Sclater, P. L. 1865c. *Limicolae*. Shufeldt, R. W. 1884d; *Shufeldt, R. W. 1903b. *Loxia coccythraustes*. Szeliga-Mierzewski, W. 1927. *Megacephalon maleo*. Giebel, C. G. 1880a. *Megapodidae*. Oustalet, J. F. 1880a. *Meleagridae*. Shufeldt, R. W. 1914b. *Merula*. Shufeldt, R. W. 1882a, 1888h. *Mesites*. Milne-Edwards, A. 1878c. *Mesoenas*. Lowe, P. R. 1924. *Microglossa alecto*. Parker, W. K. 1865a. *Microglossus*. Geoffroy St. Hilaire, E. 1823c. *Micropterus*. Cunningham, R. O. 1871-72. *Miminae*. Lucas, F. A. 1889c. *Molothrus*. Shufeldt, R. W. 1888h. *Momotus*. Murie, J. 1872e. *Monasa*. Giebel, C. G. 1861c. *Monias*. Lowe, P. R. 1924. *Mormon*. Vian, J. 1876. *Musciapidae*. *Pycraft, W. P. 1907a. *Musophagidae*. Blanchard, C. E. 1857b. *Mycteria*. Wagner, J. A. 1837. *Nannopterum harrisi*. Shufeldt, R. W. 1915c. *Nestor notabilis*. Lorenz, L. 1882; Shufeldt, R. W. 1918b. *Nothura maculosa*. Lucas, F. A. 1888c. *Notornis*. Parker, T. J. 1881. *Numenius longirostris*. *Shufeldt, R. W. 1884d. *Oceanodroma*. Shufeldt, R. W. 1889d. *Ocypterus*. Giebel, C. G. 1863. *Opisthocornus cristatus*. *Parker, W. K. 1891. *Oreoscoptes*. Shufeldt, R. W. 1882a. *Orthorhamphus magnirostris*. Shufeldt, R. W. 1915g. *Palamedea*. Gervais, F. L. 1855; Shufeldt, R. W. 1901c. *Paridae*. Lucas, F. A. 1891a. *Parra*. Giebel, C. G. 1855d. *Parridae* [*Jacaniae*]. Forbes, W. A. 1881e. *Parus*. Heim de Balsac, H. 1929b. *Passeres*. Shufeldt, R. W. 1889a. *Pelecanus*. Giebel, C. G. 1865b; Shufeldt, R. W. 1889d. *Peltops*. Sclater, P. L. 1872. *Pezophaps solitaria*. Newton, A. 1872; Newton, E. & Clark, J. W. 1879; Newton, A. & Newton, E. 1868; Owen, R. 1872. *Phalacrocorax*. Gill, T. N. 1884; Shufeldt, R. W. 1884c, 1889d. *Phalacrocorax bicristatus*. Shufeldt, R. W. 1883b. *Phalacrocorax perspicillatus*. Lucas, F. A. 1889b. *Phaleris*. Vian, J. 1876. *Phodilus*. Milne-Edwards, A. 1878b. *Phoenicopterus*. Gadow, H. F. 1877a; Shufeldt, R. W. 1901g. *Photodilus*. Beddard, F. E. 1890d. *Pici*. Shufeldt, R. W. 1891c, 1900b. *Picidae*. Burt, W. H. 1930. *Pipilo*. Shufeldt, R. W. 1888h. *Piranga*. Shufeldt, R. W. 1888h. *Pithecopaga jefferyi*. Shufeldt, R. W. 1888h.

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sheim, R. 1885. *Tinamus*. Parker, W. K. 1862a. *Todus*. Murie, J. 1872f; Selater, P. L. 1872. "Tracheophone" Passeres. *Pycraft, W. P. 1906a. Trochilidae. Giebel, C. G. 1877b; Stejneger, L. H. 1886a. *Troglodytes*. Lucas, F. A. 1889c. Tubinares [Procellariiformes]. Forbes, W. A. 1882n; *Pycraft, W. P. 1899a; Shufeldt, R. W. 1889d, 1907a. Turdidae. Lucas, F. A. 1889c; Pycraft, W. P. 1905d. *Tympanuchus* × *Pediceetes*. Shufeldt, R. W. 1893c. Tyrannidae. *Pycraft, W. P. 1907a. *Tyto*. Allen, G. M. & Greenway, J. 1935. Upupidae. Murie, J. 1873b. *Uroaetus audax*. Scott, H. H. 1909; Shufeldt, R. W. 1922.

Adaptation to flight. La Fresnaye, F. 1853.

Bursae. *Aptenodytes patagonica*. Reid, J. 1835.

Collections of bird skeletons in United States. Shufeldt, R. W. 1916d. Study collections. State Hall, Albany, N. Y. Shufeldt, R. W. 1909c.

Effects of climate and changes in habits. Many species. Lucas, F. A. 1891b.

Evolution. Includes birds. Parker, W. K. 1879a. *Gallus*. Parker, W. K. 1887.

Homologies of vertebrate skeleton. Includes birds. Owen, R. 1847.

Illustrations of noteworthy excellence. Book. Text in German. Meyer, A. B. 1879-97. Includes birds. Blanchard, E. 1851-60. Alcidae & Anatidae. *Parker, W. K. 1890. *Corvus corone*. Jacquemin, E. 1834. *Passer*. Noll, F. C. 1889a.

Measurements. See also under Quantitative works. Headley, F. W. 1893a, b. Book. Text in German. Meyer, A. B. 1879-97. *Anthus*. Shufeldt, R. W. 1882a. *Carpococcyx*. Beddard, F. E. 1901c. *Cinclus*. Shufeldt, R. W. 1882a. Fringillidae hybrids. *Klatt, G. T. 1901. *Hesperocichla*, *Merula*, *Oreoscoptes*, *Salpinctes*, *Sialia*, & *Siurus*. Shufeldt, R. W. 1882a.

Modifications of skeleton in rumplessness. *Gallus*. Landauer, W. & Dunn, L. C. 1925.

Phylogeny. Includes birds. Seeley, H. G. 1872.

Portions of skeleton. Chabrier, J. 1829.

Saurognathism. Pici. Shufeldt, R. W. 1891c.

Sex dimorphism and variability. *Gallus*. Hutt, F. B. 1929c.

Structures involved in respiration. Many species. *Zimmer, K. 1935a.

Variation. *Columba*. Peck, J. I. 1889a.

Young. *Opisthocomus cristatus*. Shufeldt, R. W. 1918a.

Articulations (Joints)

Book. Text in German. *Barkow, H. C. 1856.

General. Includes *Anser*. Bernays, A. 1878. *Colymbus*. Coues, E. B. 1867. Include *Gallus*. Bernays, A. 1878; Floderus, B. 1915.

Elbow. Include birds. Fürbringer, M. 1885a; Martins, C. F. 1858b.

Knee. Include birds. Lafite-Dupont, J. L. 1899; Martins, C. F. 1858b. Structure. *Oidemia*. Lordat,—. 1803.

Ribs. Birds incidental. Lubosch, W. 1926.

Temporo-maxillary articulations. Includes birds. Wallisch, W. 1922.

Tibio-tarsal joint. *Struthio*. Wyman, J. 1863.

Wing. *Anas* [*Dafila*] *acuta*. Wyman, J. 1855a.

Action

General. *Leptoptilus* & *Struthio*. Langer, K. 1857.

Elbow. Menier, F. 1913.

Function in flight. Many species. *Sy, M. 1936.

Neck region. Bucerotidae & *Rhytidoceros*. Desselberger, H. 1930a.

Development

General. Lubosch, W. 1914.

Diarthrodial joints, development of. Includes *Gallus* & *Larus*. Hepburn, D. 1889.

Ligaments

Books. Text in German. *Barkow, H. C. 1856.

Text in English. *Dromaeus*, *Gallus*, *Struthio*, *Tinamus*, & *Vultur*. *Sutton, J. B. 1897.

General. Bonsdorff, E. J. 1869a, b. Includes birds. Fürbringer, M. 1885a. *Aptenodytes patagonica*. Reid, J. 1835. *Corvus*. Bernstein, H. A. 1853.

Elastic ligament of neck. *Ibis* Roché, G. 1889b.

Foot ligaments. Histology. *Buteo*, *Columba*, *Corvus*, *Numenius*, *Passer*, *Scolopax*, *Sula*, & *Tetrao*. Schaffer, J. 1903.

Hyoid ligaments. *Casuaris*. Thébault, V. 1891.

Ligaments of leg. *Aquila*. Alix, H. E. 1864b.

Ligaments of vertebral column. Includes birds. Borchardt, J. 1833. *Struthio*. Virchow, H. J. 1916b.

Ligaments of pectoral girdle

General. Beautiful plates. *Bonsdorff, E. J. 1871.

Anatomy and function. *Sy, M. 1936.

Shoulder ligaments. Includes birds. Fürbringer, M. 1885a.

Ligaments of skull

General. Many species. Lebedinsky, N. G. 1921b. Fine figures. *Corvus*. Bernstein, H. A. 1853.

Ossification in ligamentum jugomaxillare. Retzius, A. A. 1824, 1826.

Ligaments of wing

General. *Pelissier, M. 1923. Many species. Fürbringer, M. 1902; Robin, C. P. & Chabry, L. M. 1884. *Anas* [*Dafila*] *acuta*. Wyman, J. 1855a.

Anatomy and function. *Sy, M. 1936.

Ligaments of elbow. Includes birds. Fürbringer, M. 1885a.

Structure of articulations

Book. Text in German. Gross and histologic structure. Many species. Birds, pp. 177–207. *Lubosch, W. 1910.

General. Lubosch, W. 1914. Many species. *Sy, M. 1936.

ATLANTO-OCCIPITAL ARTICULATION

General. Includes *Gallus* & *Passer*. *Hayek, H. 1924.

Action. *Rhea*. Virchow, H. 1917a.

Membrana atlanto-occipitalis. Virchow, H. 1917b.

FOOT ARTICULATIONS

General. *Ciconia*. Duméril, A. M. 1791.

Action and structure. *Casuaris*, *Leptoptilus*, *Otis*, *Rhea*, & *Struthio*. *Langer, K. 1859.

MANDIBULAR ARTICULATIONS

General. *Anser*, *Athene*, *Coccothraustes*, *Fringilla*, *Gallus*, & *Scolopax*. Vitali, G. 1909.

Meniscus. Includes birds. Fuchs, H. 1909.

PECTORAL GIRDLE ARTICULATIONS

General. Bonsorff, E. J. 1869a, b.

Shoulder. Includes birds. Fürbringer, M. 1885a.

STERNAL ARTICULATIONS

General. Julien, A. 1894. *Cygnus*. Yarrell, W. 1830.

Sternoclavicular articulations. Allis, T. 1835; Martin, W. C. 1835a.

VERTEBRAL ARTICULATIONS

General. Birds incidental. Lubosch, W. 1914, 1926. *Anas* & *Gallus*. *Jäger, G. 1858. *Struthio*. Virchow, H. 1916b.

Development. *Columba*, *Gallus*, & *Vanellus*. *Wamich, P. 1913.

Bone

Alterations obtained by feeding fat. Includes *Gallus*. Mori, Suzushi 1923.

Architecture. Include birds. Gebhardt, F. A. 1901, 1911; Strong, R. M. 1919.

Hemorrhage in bones at low air pressure. Aggazzotti, A. 1903.

Histology. Leydig, F. 1854a; Retterer, E. 1908.

Pigmentation of periosteum. *Galulinula*. Hering, E. 1864.

Pressure epiphyses. Includes *Columba* & *Gallus*. Parsons, F. G. 1905.

Red stain produced by feeding madder. Includes *Gallus*. Joly, N. 1860.

Specific gravity. *Dinornis* embryo. Hector, J. 1867.

Vascular supply. Includes *Anas* & *Tympanuchus*. Foote, J. S. 1921.

COMPOSITION OF BONE

Chemical composition at different ages. Weiske, H. 1889.

Effects of inadequate diet. *Gallus*. Hogan, A. G., Shrewsbury, C. L., & Kempster, H. L. 1929a.

Lack of mineral matter. *Turdus*. Barrows, W. B. 1885a.

Mineral content of bone. *Anser*, *Gallus*, & *Perdix*. Düring, F. 1897.

FRACTURES

Formation of callus. *Columba*. Bergmann, E. 1924.

Healing. *Fregilus*. Girtanner, G. A. 1873. *Gallus*. Kaupp, B. F. 1917.

STRUCTURE OF BONE

General. Camper, P. 1774, 1782, 1878; Rensch, B. 1923b. Include birds. Gebhardt, F. A. 1901; Quekett, J. T. 1849b. Accipitres. Sushkin, P. P. 1899b, 1905.

Fossil bones. Dennis, J. B. 1857.

Cartilage

Histogenesis. *Gallus*. *Fell, H. B. 1925a; Holbrook, M. L. 1886.

Interarticular fibrocartilage. *Cygnus*, *Gallus*, *Meleagris*, & *Vanellus*. Retterer, E. 1905a, b.

ARTICULAR CARTILAGE

General. Anon. 1889b.

Histology. Many species. Van der Stricht, O. 1890.

Comparative osteology

Book. Text in German. Includes birds. Eimer, G. H. 1901.

Arctic and sub-arctic water-birds. Most of the publications of this author involve comparative osteology. Shufeldt, R. W. 1888a.

Comparison with skeleton of reptiles. Seeley, H. G. 1874. *Ptilogonys*. Duges, A. 1896.

*Lorius flavopalliatu*s compared with *Psittacus erithacus*. *Mivart, St. G. 1895b.

Sexual and subspecies distinctions. Kattinger, E. 1929.

Development of skeleton

See also under **Ossification**.

Book. Text in German. Many species. Gadow, H. F. 1891d.

General. Many species. Davy, J. 1867a; *Knopfli, W. 1919. Includes birds. Brullé, A. & Huguény, —. 1845a; Hoffmann, C. K. 1879a, b.

Accipitres. Sushkin, P. P. 1899b. *Apteryx*. Parker, T. J. 1888, 1890, 1892b, 1893. Includes *Buteo*. Usov, S. A. 1906. Includes *Columba*. Brullé, A. & Huguény, —. 1845b. *Cypselus melba*. Zehntner, L. 1890a, c. *Gallus*. Bruch, C. W. 1852; *Lubosch, W. 1923; *Parker, W. K. 1888–94, 1889b; Schmalhausen, I. 1926. *Opisthocomus cristatus*. Shufeldt, R. W. 1922. Strigidae. Müller, W. 1907.

Early. Birds incidental. Schultze, C. A. 1818.

Epiphyses claimed. *Columba*. Galli & Palaeognathae. Anderson, R. J. 1909.

Experimental study. *Gallus*. Hal-ler, A. 1767b; Harting, P. 1873.

Influence of thymus gland extract on growth of bone in tissue culture. *Gallus*. Katsura, H. 1922.

Participation of ectoderm. Birds incidental. Goronovitsch, N. 1893b.

Rate graph. *Gallus*. Schmalhausen, I. 1926.

Ultraviolet light. Russell, W. C. & Massengale, O. N. 1927–28.

CHEMICAL STUDIES OF DEVELOPING SKELETON

Availability of minerals. *Gallus*. Bethke, R. M., Kennard, D. C., & Kik, M. C. 1929.

Effects of calcium carbonate and calcium sulphate. *Gallus*. Titus, H. W., McNally, E., & Hilberg, F. C. 1933.

Magnesium carbonate in diet of growing chick. *Gallus*. Buckner, G. W., Martin, J. H., & Insko, W. M. 1932.

Role of calcium of egg shell during incubation. Delezenne, C. & Fourneau, E. 1918.

Winter sunlight transmitted by glass substitute. Effects. Russell, W. C. & Massengale, O. N. 1927–28.

Pneumaticity of skeleton

In birds, the skeleton is variably invaded by air sacs which are connected with the lungs except for the skull where the connections are with the nasopharynx. This condition is correlated with size, usually. See also under **Skull**: Pneumaticity of.

Books. Text in English. Hunter, J. 1786.

Text in French. Lereboullet, A. 1838; Sappey, M. P. 1846. *Gallus*. *Campana, A. 1875.

Text in German. Schneider, J. G. 1784. Many species. Gadow, H. F. 1891d.

General. Albers, J. A. 1800b; Baer, M. 1896a; *Bignon, F. 1890a; Brandes, G. 1924a; Fatio, V. 1860, 1867; Headley, F. W. 1893a; Hertwig, R. 1903; *Jacquemin, E. 1836d, 1842; Jovanowitsch, M. 1876; Madarász, G. 1899; Nitzsch, C. L. 1804, 1808; Otto, B. C. 1777; Plateau, F. 1880; Seeley, H. G. 1866; Serres, A. E. 1846; Strong, R. M. 1919; Vrolik, G. 1803. Many species. *Bignon, F. 1889a; Lühder, W. 1871; Milne-Edwards, A. 1865, 1867; *Roché, G. 1891; *Strasser, H. 1877; Weitzel, A. 1865. Include birds. Gebhardt, F. A. 1901, 1911; Peters, W. K. 1869. Birds incidental. Gebhardt, F. A. 1911.

Anas. Enriques, P. 1906. *Aptenodytes*. Jäger, G. F. 1832. *Balaeniceps rex*. Parker, W. K. 1862b. *Bubo*. Gebhardt, F. A. 1901. *Buceros*. Nitzsch, C. L. 1826b. *Bucerotidae*. Dubois, A. 1884. *Chauna*. Crisp, E. 1864b. *Columba*. Drosier, W. H. 1866; Thilo, O. 1915. *Corvus*. Jacquemin, E. 1835a. *Cygnus*. Camper, P. 1773. *Didus*. Owen, R. 1869. *Falconiformes*. Jacquemin, E. 1836b. *Gallus*. Enriques, P. 1906; Hunter, J. 1774; Rathke, M. H. 1828b. *Graculus*. Lucas, F. A. 1894b. *Meleagris & Pandion*. Camper, P. 1773. *Pelecanus*. Lucas, F. A. 1894b. *Pelecanus rufescens*. Martin, W. C. 1835b; Owen, R. 1835. *Phalacrocorax*. Lucas, F. A. 1894b. *Rhamphastidae*. Owen, R. 1834a. *Struthio*. Hunter, J. 1774. *Sula bassana*. Bignon, F. 1889c; Owen, R. 1830–31. *Tachypetes aquilus*. Vigors, N. A. 1830–31b.

Breathing through broken wing bone. *Ardea*. Scolopax 1888.

Development of pneumaticity of skeleton. Blyth, E. 1837b. *Columba*. Blumstein-Judina, B. 1905.

Histology of pneumatic bones. *Columba* & *Gallus*. *Wildermuth, H. A. 1877.

Mechanical advantage. Camper, P. 1771.

Pneumatic foramina. Crisp, E. 1857. *Pelecanus*. *Jacquemin, E. 1842.

VARIATION IN EXTENT OF PNEUMATICITY OF SKELETON

General. Crisp, E. 1857.

Absence of pneumaticity of skeleton. *Aptenodytes patagonica*. Reid, J. 1835. *Cinclus*. Crisp, E. 1865.

Involves all limb bones including even the phalanges. *Buceros*. Owen, R. 1833.

Taxonomic treatment of skeleton

General. Blanchard, C. E. 1860c; Merrem, B. 1816; Newton, A. 1868; Shufeldt, R. W. 1904a; Wallace, A. R. 1864b. Many species. Lucas, F. A. 1895c; Seebohm, H. 1888, 1889, 1890a, b.

Accipitres. Sushkin, P. P. 1899b. *Aphriza virgata*. Shufeldt, R. W. 1888e. *Chaetura*. Lucas, F. A. 1886. *Chamaea*. Shufeldt, R. W. 1889e. Chionidiidae. Lowe, P. R. 1916a. *Chionis minor*. Reichenow, A. 1876. Coerebidae. Lucas, F. A. 1895c. Corvidae. Shufeldt, R. W. 1888f. *Dendrocygna*. Shufeldt, R. W. 1915d. *Eudyptes*. Filhol, H. 1882c. *Hemipodius*. Parker, W. K. 1862a. Icteridae. Shufeldt, R. W. 1888f. *Mesoenas*. Lowe, P. R. 1924. *Palamedea chavaria*. Parker, W. K. 1863. *Parus coerules*, *Parus major*, & *Parus niger*. Giebel, C. G. 1854c. Procnatiidae. Lucas, F. A. 1896d. Psittaci. Forbes, W. A. 1879. *Pterocles*. Parker, W. K. 1862a. Ratitae [Paleognathae]. Dubois, A. J. 1912a. *Rhynchops*. Brandt, J. F. 1840c. *Spheniscus*. Filhol, H. 1882c. *Sturnella*. Shufeldt, R. W. 1888f. *Syrnhaptes* & *Tinamus*. Parker, W. K. 1862a. *Totanus*. Nichols, J. T. 1923b.

APPENDICULAR SKELETON

Limb bones

Book. Text in Latin. Borelli, G. A. 1685.

General. Many species. *Sabatier, C. P. 1878-79. Include birds. Gervais, F. L. 1853; Hauch, J. C. 1822.

Anser, *Archaeopteryx*, *Columba*, *Gallus*, *Larus*, & *Melopsittacus*. Steiner, H. 1923. Spheniscidae. Coues, E. B. 1872.

Reciprocal relations of axes. Includes birds. Schmid, F. 1873.

DEVELOPMENT OF LIMB BONES

General. *Cypselus melba*. Zehntner, L. 1890b. *Gallus*. Brachet, A. 1893; *Fell, H. B. 1925a; Mehnert, E. 1897; Schmalhausen, I. & Stepanowa, J. 1926. Includes *Gallus* embryo. Floederus, B. 1915. *Gallus* incidental. Goette, A. W. 1878. *Struthio*. *Broom, R. 1906; Mehnert, E. 1897; Nassonow, N. V. 1896a.

Growth and regeneration. Includes *Columba* & *Gallus*. Maas, H. 1877.

Number. Shufeldt, R. W. 1882b.

Reduction in elements. *Gallus*. Rosenberg, A. 1873.

Structure. Camper, P. 1774; Massa, M. 1928.

LEG BONES

General. Many species. Quennerstedt, A. 1872. *Aquila*. Alix, H. E. 1864b. *Dromaeus* [*Dromiceius*]. *Eudyptes*. Grunert, P. 1906; Haughton, S. 1867b. *Rhea*. Haughton, S. 1867c. *Struthio*. Haughton, S. 1867a.

Development. *Eudyptes chrysocome*. Grunert, P. 1906. *Gallus*. Johnson, A. 1883; Mehnert, E. 1897. *Struthio*. Mehnert, E. 1897a.

Femur

Comparative histology of cross section. Foote, J. S. 1910, 1912, 1913.

Direction of axes of neck and condyles of femur. Includes birds. Martins, C. F. 1857a.

Third trochanter. Relation to dinosaurs. Includes *Anas*. Dollo, L. 1883.

Fibula

General. *Colymbus*. Shufeldt, R. W. 1885a, 1894c. *Pandion*. Baur, G. H. 1885a; Shufeldt, R. W. 1894c. *Plotus* & *Sula*. Shufeldt, R. W. 1894c.

Tibiotarsus

General. *Gastornis*. Lartet, E. 1855.

Mineral content, in chicks with "slipped tendon." *Gallus*. Holmes, A. D., Pigott, M. G., & Moore, W. B. 1883.

Pro- and ectocnemial processes. Young. *Geococcyx*. Shufeldt, R. W. 1887i.

Sex distinctions in size and composition during growth. Holmes, A. D., Pigott, M. G., & Moore, W. B. 1932.

Foot bones

Book. Text in German. *Struthio*. Rabl, C. 1910.

General. Baur, G. H. 1883, 1885e; *Kessler, K. F. 1841; Lucas, F. A. 1894a; Mitchell, P. C. 1894a. Many species. Regalia, E. 1910; Schweder, G. 1908.

Columbus. Rosenberg, F. T. 1911. *Didus*. Owen, R. 1846. *Gallus*. Kaufmann-Wolf, M. 1908. *Pygoscelis*. Anthony, R. L. & Gain, L. 1913b. *Serresius galeatus*. Eudes-Deslongchamps, J. A. 1860. Striges. Beddard, F. E. 1888c. *Struthio camelus*. Riley, H. 1836.

Development. *Cypselus melba*. Zehntner, L. 1890b. *Gallus*. Gegenbaur, C. 1863.

Structure. *Gallus*. Gegenbaur, C. 1863, 1864a.

Metatarsal bones

General. *Eudytes*. Menzбир, M. A. 1887.

Accessory metatarsal. *Fraterculinae*. Shufeldt, R. W. 1888g.

Hallux metatarsal. *Lunda*. Shufeldt, R. W. 1888g.

Phalanges

Book. Text in German. *Struthio*. Rabl, C. 1910.

Number. *Struthio*. Allis, T. 1838a.

Reduction of hallux. Abel, O. 1911.

Tarsal bones

General. *Casuarus*, *Leptoptilus*, *Otis*, *Rhea*, & *Struthio*. Langer, K. 1859.

Ascending process. Morse, E. S. 1875, 1880.

Development. Morse, E. S. 1874. Many species. Morse, E. S. 1880.

Homology. Morse, E. S. 1871, 1874.

WING BONES

General. Hann, O. 1877c; Heusinger, K. F. 1820; Pycraft, W. P. 1902a. Many species. Fürbringer, M. 1902; Sundevall, C. J. 1843, 1886. Carinate birds. Parker, W. K. 1888d.

Anas [Dafila] acuta. Wyman, J. 1855a. *Archaeopteryx*. Pycraft, W. P. 1894. *Columba*. Hurst, C. H. 1893. Includes *Columba*. Cuénod, A. 1888. *Diomedea*. Hector, J. 1895. *Eudytes*. Hillel, E. 1904. *Gallus*. Cuénod, A. 1888. *Opisthocomus*. Banzhaf, W. 1929. *Pezoporus*. Hector, J. 1895. *Phalacrocorax*. Gadow, H. F. 1902. *Procellariidae*. Reinhardt, J. T. 1873b. *Stringops*. Hector, J. 1895.

Comparative osteology of wing. Includes birds. Martins, C. F. 1871.

Development. *Catarrhactes*. Anthony, R. L. & Gain, L. 1912. *Gallus*. Mehnert, E. 1897; Parker, W. K. 1889b; *Prein, F. 1915. *Pygoscelis*. Anthony, R. L. & Gain, L. 1912. *Sterna wilsoni [hirundo]*. Leighton, V. L. 1894. *Struthio*. Mehnert, E. 1897. Book. Text in French. *Pygoscelis*. Anthony, R. L. & Gain, L. 1915.

Early development. *Anas*, *Anser*, & *Gallus*. *Steiner, H. 1922.

Function and anatomy. *Bucephala*, *Lyrurus*, & *Mergus*. Sy, M. 1936.

Proportions. *Cypselus [Hirundo] melba*. Zehntner, L. 1890c.

Humerus

General. *Jäger, G. 1857. Includes birds. Lavocat, A. 1880.

Caprimulgi & Cypselidae. Shufeldt, R. W. 1886a. *Diomedea*. Lartet, E. 1857. *Mancalla*. (Fossil birds.) Lucas, F. A. 1902. *Pelagornis*. Lartet, E. 1857. *Trochili*. Shufeldt, R. W. 1886a. *Trochilidae* (error in labeling). Shufeldt, R. W. 1886c.

Nerve canals. *Casuarus* & *Macrochires*. Fürbringer, M. 1886.

Normal torsion. Includes birds. Durand, J. P. 1872.

Carpal bones

General. *Apteryx*, *Archaeopteryx*, *Columba*, *Dromaeus* [*Dromiceius*], & *Gallus*. Norsa, E. 1895.

Development. Morse, E. S. 1874; Norsa, E. 1894. Homologies. Morse, E. S. 1871, 1874.

Hand bones

General. Lucas, F. A. 1895h. Many species. Abel, O. 1911. *Apteryx*, *Archaeopteryx*, *Columba*, *Dromaeus*, & *Gallus*. Norsa, E. 1895. *Carinatae* [*Neognathae*]. Parker, W. K. 1888d. *Phoenicopter*. Parker, W. K. 1889a. *Ratitae* [*Paleognathae*]. Parker, W. K. 1888b.

Development. Norsa, E. 1894. Many species. Abel, O. 1911. *Colymbus*. Rosenberg, F. T. 1911.

Metacarpal bones. Lambrecht, K. 1914a.

Phalanges. Baur, G. 1885b. *Cypselus* [*Apus*] *melba*. Zehntner, L. 1890c.

Vestigial phalanges

General. *Struthio*. Wray, R. S. 1887a.

Fourth finger. *Opisthocomus cristatus*. Parker, W. K. 1891.

Pectoral girdle

Book. Text in English. *Machaeorampus*. Andersson, C. J. 1872.

Text in German. Berthold, A. A. 1831. Includes *Apteryx*, *Casuarius*, & *Rhea*. Pfeiffer, H. 1854.

General. Bonsdorff, E. J. 1869a, b, 1871; Harting, P. 1864; Heilmann, G. 1929; Lidén, A. J. 1875. Many species. Fürbringer, M. 1902; *L'Hermier, F. J. 1827; Magnus, H. F. 1868; *Sabatier, C. P. 1878-79; Waite, E. R. 1892b. Include birds. Hoffmann, C. K. 1879a, b; Lavocat, A. 1883c. Beautiful figures. *Jäger, G. 1857.

Accipiter. Rolleston, G. 1869. *Anser fabalis* & *Anser neglectus*. Szalay, E. L. 1902. *Aptenodytes*. Sclater, P. L. 1888. *Columba*. Cuénod, A. 1888. *Diomedea*. Hector, J. 1895. *Dromaeus*. Rolleston, G. 1869. *Fregata*. Shufeldt, R. W. 1894a. *Gallinae*. Rolleston, G. 1869. *Gallus*. Cuénod, A. 1888. *Larus canus* & *Larus ridibundus*. Szalay, E. L. 1902. *Olor*. Dionne, C. E. 1918.

Pezoporus. Hector, J. 1895. *Phalacrocorax bicristatus*. Shufeldt, R. W. 1883b. *Phlogoenas criniger*. Sclater, P. L. 1865a. *Pica*. Daudin, F. M. 1803. *Serresius galeatus*. Eudes-Deslongchamps, J. A. 1860. *Somateria*. Rowley, G. D. 1877. *Stringops*. Hector, J. 1895. *Struthio*. Rolleston, G. 1869.

Comparative discussion based on torsion of humerus. Includes birds. Martins, C. F. 1868.

Function. *Bucephala*, *Lyrurus*, & *Mergus*. *Sy, M. 1936.

DEVELOPMENT

Book. Text in English. Includes birds. Parker, W. K. 1868.

General. *Knopfli, W. 1917, 1919. *Anas*, *Columba*, & *Gallus*. Kulczycki, W. 1901, 1903.

Effect of limb buds. *Gallus*. Spurling, R. G. 1923.

HOMOLOGIES

General. Many species. Parker, W. K. 1864b. With precoracoid of reptiles. Broom, R. 1912.

STRUCTURE

Book. Text in English. Includes birds. Parker, W. K. 1868.

General. *Knopfli, W. 1917, 1919. Many species. *Lühder, W. 1871. *Bucephala*, *Lyrurus*, & *Mergus*. Sy, M. 1936.

Coracoscapular angle

General. Many species. Nauck, E. T. 1930a.

Alteration and development. *Gallus*. Nauck, E. T. 1930b.

VARIOUS BONES OF PECTORAL GIRDLE

Coracoid bone. Bayer, F. 1885; Broom, R. 1912. Birds incidental. Howes, G. B. 1893a. *Anser* & *Larus*. Szalay, E. L. 1902.

Scapula. *Jäger, G. 1857.

Furcula (Clavicles)

General. Bonsdorff, E. J. 1869a, b. Many species. *Bonsdorff, E. J. 1871; Weitzel, A. 1865. *Anas*, *Anthropoides*, & *Ardea*. Yarrell, W. 1827a. *Anser* & *Larus*. Szalay, E. L. 1902. *Manu-*

codia. Pavesi, P. 1874. *Mergus* & *Numida*. Yarrell, W. 1827a.

Absence. Many species. Münter, W. 1853. *Psittacus*. Garrod, A. H. 1874e; Kuhlmann, H. 1842. *Psittacidae*. Vigors, N. A. 1830-31a. *Trochilus*. Münter, W. 1853.

Development. Kulczycki, W. 1903. Includes birds. Bruch, C. W. 1853. *Anas*. Hommes, J. H. 1924; Kulczycki, W. 1901. *Columba*. Kulczycki, W. 1901. *Gallus*. Hommes, J. H. 1924; Kulczycki, W. 1901, 1908. *Serinus*. Kulczycki, W. 1908.

Taxonomic bearing. *Psittacidae*. Garrod, A. H. 1874e.

Sternum

General. Balducci, E. 1906, 1908, 1925; Dieck, R. 1865; Hann, O. 1877a; Harting, P. 1864; Velten, W. 1861. Many species. Blasius, W. 1877, 1884; Bonsdorff, E. J. 1871; *L'Herminier, F. J. 1827; Magnus, H. F. 1868; Shufeldt, R. W. 1887h. Include birds. Breschet, G. 1838; Hoffmann, C. K. 1879a, b; Lavocat, A. 1889. Birds incidental. Sabatier, C. P. 1902.

Anas & *Anthropoides*. Yarrell, W. 1827a. *Anas punctata*. Newton, A. 1871. *Anser*. Szalay, E. L. 1902. *Aptenodytes*. Sclater, P. L. 1888. *Aquila*. Segond, L. A. 1864b. *Ardea*. Yarrell, W. 1827a. *Calamophilus biarmicus*. Tomes, R. F. 1860. *Chamaepelia* & *Columba*. Newton, A. & Newton, E. 1868. *Conopophaga*. Forbes, W. A. 1881a. *Coracias*. Sharpe, R. B. 1871. *Cygnus*. Segond, L. A. 1864b; Murie, J. 1867a; Wedel, G. W. 1871; Yarrell, W. 1832a. *Didunculus*. Newton, A. & Newton, E. 1868. *Gallinae*. Jeffries, J. A. 1883i. *Gallus*. Segond, L. A. 1864b. *Geopelia* & *Goura*. Newton, A. & Newton, E. 1868. *Indicator xanthonotus*. Stoliczka, F. 1873. *Larus*. Szalay, E. L. 1902. *Leucosarcia*. Newton, A. & Newton, E. 1868. *Manucodia*. Pavesi, P. 1874. *Mergus*. Yarrell, W. 1827a. *Notornis*. Owen, R. 1882. *Numida*. Yarrell, W. 1827a. *Opisthocomus*. Beebe, C. W. 1909b; Gadow, H. F. 1891-93. *Palagioenas*. Newton, A. & Newton, E. 1868. *Phalacrocorax bicristatus*. Shufeldt, R. W. 1883b. *Phalacrocorax perspicillatus*. Lucas, F. A. 1896a. *Phytoloma rara*. Eydoux, J. F. & Gervais, F. L. 1838. *Ploceidae*. Chapin, J. P. 1917.

Porzana. Boulton, W. W. 1864b. *Scotopelia peli*. Murie, J. 1872g. *Serresius galeatus*. Eudes-Deslongchamps, J. A. 1860. *Struthio*. Geoffroy St. Hilaire, E. 1833; Segond, L. A. 1864b. *Sula*. Flower, J. 1879b. *Totanus solitarius*. Shufeldt, R. W. 1888j. *Vulturidae*. Eyton, T. C. 1849.

Crooking of sternum. *Gallus* & *Meleagris*. Anderson, R. J. 1900.

Origin. Julien, A. 1894.

Phylogeny. Includes *Apteryx*. Parker, T. J. 1891.

Relation to lungs. Neither present without the other. Julien, A. 1894.

Taxonomic bearing. Blainville, H. M. 1821; Gervais, F. L. 1856. *Chionis*. Blainville, H. M. 1836. *Corythaix*. Blainville, H. M. 1826. *Passeres*. Garrod, A. H. 1876g. *Psophia agami*. Blainville, H. M. 1825.

Variations in position. *Casuarus*. Kothe, K. 1911.

Weights and measurements. *Athene*. Balducci, E. 1903.

Wing area relation. Marey, E. J. 1869a.

Development

General. Lindsay, B. 1885. *Anas*. Geoffroy St. Hilaire, E. 1833; Geoffroy Saint-Hilaire, I. 1832b, 1837b; Hommes, J. H. 1924. *Columba*. Geoffroy St. Hilaire, E. 1833; Geoffroy Saint-Hilaire, I. 1832b, 1837b. *Gallus*. Geoffroy St. Hilaire, E. 1833; Geoffroy Saint-Hilaire, I. 1832b, 1837b; Hommes, J. H. 1924; Rathke, M. H. 1838b. *Struthio*. Geoffroy St. Hilaire, E. 1833.

Ossification centers. L'Herminier, F. J. 1836.

Morphology

General. L'Herminier, F. J. 1836; Julien, A. 1894; Lindsay, B. 1885. Many species. *Lühder, W. 1871. Includes birds. Lavocat, A. 1865.

Bulla ossea. *Anas punctata*. Newton, A. 1871.

Tracheal coils in sternum. See also under **Respiratory organs**: Loops of trachea. Dieck, R. 1865. *Cygnus buccinator*. Wyman, J. 1844.

Xiphoid bone. Function. *Pelecanus* [*Phalacrocorax*] *carbo*. Yarrell, W. 1828a.

Pelvic girdle

Book. Text in English. *Mullerornis*. Lowe, P. R. 1930.

General. Baur, G. H. 1884, 1885c; *Gegenbaur, C. 1871; Geoffroy St. Hilaire, E. 1823a. Many species. Haij, B. 1887; *Sabatier, C. P. 1878-79. Includes birds. Seeley, H. G. 1891. Birds incidental. Martins, C. 1857b. Carinate birds. Haij, B. 1887-88.

Aquila & *Cygnus*. Segond, L. A. 1864b. *Dromaeus* [*Dromiceius*] *novae-hollandiae*. Houghton, S. 1867b. *Eudytes*. Grunert, P. 1906; Menzbir, M. A. 1887. Falconidae. Shufeldt, R. W. 1886d. *Gallus*. Marcucci, E. 1924; Segond, L. A. 1864b. *Rhea*. Houghton, S. 1867c. *Struthio*. Houghton, S. 1867a, c; Segond, L. A. 1864b.

Homologies. *Corvus*, *Larus*, & *Podiceps*. Levin, B. 1926.

In various vertebrates. Martins, C. F. 1868.

Phylogeny. Includes birds. Kehrner, F. A. 1895.

Sex differences. Psittacidae. Knobel, E. M. 1924.

ANATOMY

General. Many species. Lebedinsky, N. G. 1913.

Ilium. Haij, B. 1887-88. Includes birds. Romer, A. S. 1923.

Processus pectinealis. *Struthio*. Lebedinsky, N. G. 1914.

Pubis. Falconidae. Shufeldt, R. W. 1886d.

DEVELOPMENT

General. *Mehnert, E. 1888. Many species. Lebedinsky, N. G. 1913. Includes *Anas*. Bunge, A. 1880. *Eudytes chrysocome*. Grunert, P. 1906. *Gallus*. Johnson, A. 1883; Kitamura, S. 1929. Includes *Gallus*. Bunge, A. 1880.

Effect of limb buds. *Gallus*. Spurling, R. G. 1923.

AXIAL SKELETON

See also under **Skull**.

General. Pelecanidae. *Mivart, St. G. 1879a. *Struthio*. *Mivart, St. G. 1877. *Struthionidae*. Mivart, St. G. 1879b.

Ribs

General. Hann, O. 1877a; Parker, W. K. 1888e. Many species. *Adolphi, H. 1922; Magnus, H. F. 1868. Include birds. Lavocat, A. 1889; Müller, August 1853. Birds incidental. Lubosch, W. 1926. *Gallus*. Hasse, C. & Born, G. 1879.

Development. *Knopfli, W. 1917, 1919.

Function. Jones, F. W. 1913.

Number. Many species. Adolphi, H. 1922; Magnus, H. F. 1868. *Cypseloides*. Lucas, F. A. 1893d.

UNCINATE PROCESSES

General. Includes birds. Behrens, W. 1880. *Gallus*. Anasiewiczowna, S. 1928.

Vertebral column

General. Hann, O. 1877d. Include birds. Baur, G. H. 1887d; Blainville, H. D. 1837b; Müller, A. 1853; Sabatier, C. P. 1878-79.

Includes *Aquila*. Segond, L. A. 1864b. Includes *Ardea*. Virchow, H. J. 1914. Includes *Buceros* & *Bucorvus*. Gadow, H. F. & Abbott, E. C. 1897. Includes *Cygnus*. Segond, L. A. 1864b. Include *Gallus*. Gadow, H. F. & Abbott, E. C. 1897; Segond, L. A. 1864b. *Plotus*. Doenitz, F. C. 1873; Virchow, H. J. 1917b. Include *Struthio*. Segond, L. A. 1864b; Virchow, H. J. 1916b.

Good for details of vertebral terminology. *Didus*. Owen, R. 1869.

ACTION

General. *Grus*. Virchow, H. J. 1918. *Plotus ankinga*. *Virchow, H. J. 1917b. *Struthio*. Virchow, H. J. 1916b.

Mobility. *Asio o. otus*. Virchow, H. J. 1927. *Phoenicopterus*. Virchow, H. J. 1916a. *Spheniscus*. Virchow, H. J. 1910.

DEVELOPMENT OF VERTEBRAE

General. Meckel, J. F. 1820. Many species. Schablowaskaja, V. G. 1925. Include birds. Bruni, A. C. 1910; Schultze, C. A. 1818. Birds incidental. Rindfleisch, E. 1863. *Eudytes*. *Männich, H. 1903. *Gallus*. Schwarcck, W. 1873. Includes *Gallus*. Ebner, V. 1889. *Larus* & *Struthio*. Piiper, J. 1928.

Early development. *Anas*. Sonies, F. 1907. *Gallus*. *Froriep, A. 1883; Sonies, F. 1907. Includes *Gallus*. Leboucq, H. 1880. *Haematopus*, *Larus*, & *Passer*. Sonies, F. 1907.

Number and order of first vertebral anlagen. *Gallus*. Fol, H. 1884.

MORPHOLOGY OF VERTEBRAE

General. Many species. *Adolphi, H. 1922; Schablowskaja, V. G. 1925. Birds incidental. Dollo, L. 1893. *Struthio*. Mivart, St. G. 1877; Virchow, H. J. 1916b.

Articular processes. Include birds. Blainville, H. 1837a, b.

Divisions according to nerves. Book. Text in German. Many species. Ihering, H. 1878.

Intercentra. Beddard, F. E. 1897a; Parker, W. K. 1888e.

Length. *Plotus*. Virchow, H. J. 1917b.

Variation. *Columba*. Peck, J. I. 1889b.

NUMBER OF VERTEBRAE

General. Many species. Adolphi, H. 1922; *Giebel, C. G. 1866b. *Bucco* & *Monasa*. Giebel, C. G. 1861c. *Laridae*. Shufeldt, R. W. 1893b. *Pezophaps solitaria*. Newton, E. & Clark, J. W. 1879. *Trogon*. Giebel, C. G. 1861c.

Variations in number in different orders and regions. MacLeay, W. S. 1829.

REGIONS OF VERTEBRAL COLUMN

General. Many species. Garbowski, T. 1895b.

Cervical vertebrae

General. *Bucerotidae*. Desselberger, H. 1930a. *Plotus*. Doenitz, F. C. 1873.

Atlas. Birds incidental. Bergmann, C. G. 1845. Includes *Gallus* & *Passer*. Hayek, H. 1924.

Axis vertebra (*Epistropheus*). Birds incidental. Bergmann, C. G. 1845. *Anser* incidental. Virchow, H. J. 1921.

Thoracic vertebrae

Development and structure. Knopfli, W. 1917, 1919.

Lumbosacral region

General. Many species. *Haij, B. 1887.

Synsacral vertebrae. *Gegenbaur, C. 1871; Paris, P. 1916; *Sabatier, C. P. 1878-79. Many species. Mivart, St. G. & Clarke, R. 1879; Parker, W. K. 1863. Includes birds. Rosenberg, E. W. 1875. *Gallus*. *Toit, P. J. 1913.

Caudal vertebrae

General. Marshall, W. A. 1872a. Many species. van Oort, E. D. 1905. *Gallus*. *Toit, P. J. 1913.

Development and structure. Many species. van Oort, E. D. 1905.

Pygostyle. Many species. Giebel, C. G. 1855c. *Gallus*. Kageyama, T. 1929.

Relation to notochord. Birds incidental. Schmidt, V. 1895.

SESAMOID BONES

General. Gebhardt, F. A. 1901; *Giebel, C. G. 1866c. *Falco*. Jäger, G. 1859. *Phalacrocorax*. Shufeldt, R. W. 1884c.

Patella

General. Many species. Shufeldt, R. W. 1885b; *Wagner, R. 1827a. Includes birds. Giebel, C. G. 1879. *Phalacrocoracidae*. Shufeldt, R. W. 1913d. *Phalacrocorax*. Jeffries, J. A. 1883g, 1884b.

Development. *Gallus*. Kaczander, J. 1887a.

Wing sesamoid bones

General. Jeffries, J. A. 1882c. Many species. Robin, C. P. & Chabry, L. M. 1884. *Procellariidae*. Reinhardt, J. T. 1873b.

In *M. tensor patagii longus* near distal end of radius. Lucas, F. A. 1882.

Os humero-capsularis. Heusinger, K. F. 1820.

Ossicle of antibrachium. *Accipter*, *Buteo*, & *Circus*. Shufeldt, R. W. 1881c.

SKULL

Books. Text in English. *Heilmann, G. 1926; Owen, R. 1866-68. *Anas* & *Apteryx*. Parker, T. J. & Haswell, W.

A. 1897. Includes *Gallus*. *Parker, W. K. & Bettany, G. T. 1877.

Text in French. Includes birds. Geoffroy St. Hilaire, E. 1818a.

Text in German. Includes birds. *Köstlin, O. 1844.

Text in Latin. Includes birds. Spix, J. B. 1815.

General. Coues, E. B. 1883; Gadow, H. F. 1897; Halbertsma, H. J. 1862; Huxley, T. H. 1867; Malacarne, V. 1782; Müller, Arnold 1926; Sutton, J. B. 1884. Many species. Forbes, W. A. 1881g; Hérissant, F. D. 1752; *Magnus, H. F. 1871; Shufeldt, R. W. 1887h; Staurengi, C. 1902. Include birds. Baur, G. H. 1895; Calori, L. 1893; Cuvier, G. L. 1812; Fleischmann, A. 1903; Fuchs, H. 1910; Geoffroy St. Hilaire, E. 1808, 1818b, 1820a; Hoffmann, B. 1882; Huxley, T. H. 1859, 1868c; Lavocat, A. 1862a; Parker, W. K. 1885; Peters, W. K. 1874. Birds incidental. Jaekel, O. 1926. Blood-sucking birds. Moller, W. 1931. Polish fowl. Dareste, C. 1865d.

Acanthorhynchus. Lucas, F. A. 1894c. *Aegithognathae*. *Parker, W. K. 1877, 1878. Include *Anas*. Bergmann, C. G. 1845; Sippel, W. 1908. *Anser*. Oken, L. 1817; Staurengi, C. 1896; Weber, M. I. 1824. Includes *Anser*. Bergmann, C. G. 1845. *Aptenodytes*. Selater, P. L. 1888; Pycraft, W. P. 1899a. *Apteryx*. Owen, R. 1841; Versluys, J. 1910, 1912. *Aramus*. Garrod, A. H. 1876d. *Arboricola*. Ogilvie-Grant, W. R. 1895b. *Ardea*. Aldrovandus, U. 1610-13, 3, 379. Includes *Athene*. Staurengi, C. 1913-14. *Balaeniceps*. Bohm, M. 1930. *Balearica*. Beddard, F. E. 1904b. *Caprimulgidae*. Oberholser, H. C. 1914; *Shufeldt, R. W. 1885c. *Caprimulgus*. Lubosch, W. 1929; *Parker, W. K. 1879b. *Cardinalis*. *Parker, W. K. 1879b. *Cathartidae*. Beddard, F. E. 1903a. *Certhidia*. Snodgrass, R. E. 1903. *Certhiola*. Lucas, F. A. 1895c. *Charadriidae*. Beddard, F. E. 1901b. *Chauna*. Garrod, A. H. 1876e. *Chlorophonia*. Clark, H. L. 1913a. *Cocornis*. Snodgrass, R. E. 1903. *Coereba*. Lucas, F. A. 1894c, 1895c. *Colius*. Garrod, A. H. 1876b. *Columba*. Carl, L. 1878; Shufeldt, R. W. 1901d; Weber, M. I. 1824. Include *Columba*. Beer, G. R. 1926; Staurengi, C. 1900a, b. *Colymbus*. Coues, E. B. 1864. *Coracias*. Sharpe, R. B. 1871. *Corvi-*

dae. Bernstein, H. A. 1853; Shufeldt, R. W. 1888g. *Corvus*. *Parker, W. K. 1879b. *Cypselidae*. Shufeldt, R. W. 1885c. *Cypselus*. *Parker, W. K. 1879b. *Dendroica*. Lucas, F. A. 1894c. *Didus*. Owen, R. 1846. Includes *Elaphes*. Staurengi, C. 1913-14. *Eudytes*. Menzbir, M. A. 1887. *Euphonia*. Clark, H. L. 1913a. *Fraterculinae*. Shufeldt, R. W. 1888g. *Galinae*. Boas, J. E. 1914. *Gallus*. Hagenbach, E. 1838; *Parker, W. K. 1879b; Staurengi, C. 1900a; Weber, M. I. 1824. Includes *Gallus*. Bergmann, C. G. 1845. *Gecinus*. Garrod, A. H. 1872a. *Geospiza*. Snodgrass, R. E. 1903. *Glossoptila*. Lucas, F. A. 1894c, 1895c. *Grandala coelicolor*. Pycraft, W. P. 1927. *Gymnorhina* & *Gyps*. *Parker, W. K. 1879b. *Habia*. Shufeldt, R. W. 1888h. *Hesperiphona*. Sushkin, P. P. 1925a. *Indicator*. Garrod, A. H. 1878c. *Linota*. *Parker, W. K. 1879b. *Meleagris*. Shufeldt, R. W. 1887l. Include *Meleagris*. Sippel, W. 1908; Staurengi, C. 1900b. *Merula* & *Molothrus*. Shufeldt, R. W. 1888h. *Numenius*. Owen, R. 1841. *Pandion haliaetus*. Shufeldt, R. W. 1891d. Includes *Passer*. Beer, G. R. 1926. *Passer montana*. Okabe, T. 1930. *Passerella iliaca*. Linsdale, J. M. 1928c. *Passeres*. Shufeldt, R. W. 1889a. *Pelecanoides*. *Parker, W. K. 1879b. *Pelecanus* [*Phalacrocorax*] *carbo*. Rudolphi, C. A. 1819. *Phaethon*. Beddard, F. E. 1897b. *Phalacrocorax*. Shufeldt, R. W. 1884c. *Phalacrocorax bicristatus*. Shufeldt, R. W. 1883b. *Phalacrocorax perspicillatus*. Lucas, F. A. 1896a. *Phytotoma*. Eydoux, J. F. & Gervais, F. L. 1838. *Picidae*. Parker, W. K. 1875. *Pipilo* & *Piranga*. Shufeldt, R. W. 1888h. *Ploceidae*. Chapin, J. P. 1917. *Podasocys montanus*. Shufeldt, R. W. 1884a. *Pseudocalyptomena*. Lowe, P. R. 1931. *Psittaci*. Thompson, D. W. 1899. *Psittacidae*. Boas, J. E. 1914. *Psittacus*. Rousseau, L. F. 1839. *Pygopodes*. *Pycraft, W. P. 1899a. *Rhea*. Boas, J. E. 1914; Gadow, H. F. 1889a; Versluys, J. 1910, 1912; Virchow, H. 1917a. *Rhynchotus*. Boas, J. E. 1914. *Saltator*. Clark, H. L. 1913a. *Scolopax*. Marinelli, W. 1928. *Scythrops*. *Parker, W. K. 1879b. *Spheniscidae*. Coues, E. B. 1872; Pycraft, W. P. 1907g. *Steatornis*. Garrod, A. H. 1873c. *Steganopodes* [*Pelecaniformes*]. Pycraft, W. P. 1898b. *Striges*. Beddard, F. E. 1888c. *Strigidae*. Collett, R. 1881; Kaup, J. J.

1862. Include *Strix*. Staurengi, C. 1900b, 1913-14. *Struthio*. Gadow, H. F. 1889a; Peters, W. K. 1867a; Versluys, J. 1910, 1912. *Sturnus*. *Parker, W. K. 1879b. *Sula*. Culemann, H. W. 1929. Includes *Syrnium*. Staurengi, C. 1913-14. *Tachycineta*. Lucas, F. A. 1887. *Tetrao urogallus*. Graff, L. 1885. *Tetraonidae*. *Shufeldt, R. W. 1881f. *Tinnunculus alaudarius*. Sushkin, P. P. 1899b. *Trochilidae*. *Shufeldt, R. W. 1885c. *Troglodytes*. *Parker, W. K. 1879b. *Tropicoperdix*. Ogilvie-Grant, W. R. 1895b. *Tubinares* [Procellariiformes]. Pycraft, W. P. 1899a. Includes *Vanellus*. Sippel, W. 1908.

Streptognathous skull. *Caprimulgus*. Lubosch, W. 1929.

DEVELOPMENT

Book. Text in English. Excellent illustrations. *Huxley, T. H. 1864.

General. Chomjakoff, M. 1901. Many species. *Parker, W. K. 1879b; Schablowaskaja, V. G. 1925. Include birds. Maggi, L. 1903; Rathke, M. H. 1863. Birds incidental. Rathke, M. H. 1839.

Apteryx. Parker, W. K. 1866b. *Caprimulgus* & *Cardinalis*. Parker, W. K. 1879b. *Casuarii*. *Parker, W. K. 1866b. *Corvus*. *Kohts, A. E. 1912; *Parker, W. K. 1872, 1879b. *Cotyle*. Schablowaskaja, V. G. 1925. *Cypselus* & *Dicholophus*. Parker, W. K. 1879b. *Dinornis* & *Dromaeus* [Dromiceius]. *Parker, W. K. 1866b. *Falconiformes*. Sushkin, P. P. 1896b. *Gallus*. *Parker, W. K. 1869, 1879b. *Gavia*, *Gymnorhina*, *Gyps*, *Linota*, & *Megalaema*. Parker, W. K. 1879b. *Nisus*. Parker, W. K. 1873c. *Notornis* & *Palapteryx*. Parker, W. K. 1866b. *Parus*. *Parker, W. K. 1873c. *Phalacrocorax*. Young bird. Lucas, F. A. 1896e. *Picidae*. Parker, W. K. 1875. *Ratitae* [Palaeognathae]. Parker, W. K. 1865b, 1879b. *Rhea*. Parker, W. K. 1866b, 1879b. *Scythrops*. Parker, W. K. 1879b. *Struthio*. *Parker, W. K. 1866b. *Sturnus*. Parker, W. K. 1879b. *Tinamus*. *Parker, W. K. 1866b. *Tinnunculus*. Schablowaskaja, V. G. 1925. *Troglodytes*. Parker, W. K. 1879b. *Turdus*. Parker, W. K. 1873b. *Yungidae*. Parker, W. K. 1875.

Good figure at 10 days' incubation. *Gallus*. Tonkov, V. N. 1900b.

With herniated brain (crested fowl). *Gallus*. Klatt, B. 1910, 1911.

Early development

General. Includes *Columba*. Filatoff, D. 1906.

Cartilaginous vertebral elements in development of skull. *Anas* & *Gallus*. Wijhe, J. W. 1907a, 1908.

Chondrocranium. *Anas* & *Gallus*. Sonies, F. 1907; Wijhe, J. W. 1907b, 1912. *Haematopus*, *Larus*, & *Passer*. Sonies, F. 1907.

Ectodermal origin of skull elements. Critical. Birds incidental. Goronovitsch, N. 1893b.

Laws of development same in anomalies as in normal skulls. Lavocat, A. 1863.

Metamerism. Include birds. Belogolowy, J. A. 1911; Gaupp, E. 1897.

Occipital region of skull. *Gallus*. *Froriep, A. 1883.

STRUCTURE

General. Many species. *Parker, W. K. 1877, 1879b; Schablowaskaja, V. G. 1925. Includes birds. Lavocat, A. 1862b. Birds incidental. Parker, W. K. 1873a.

Apteryx. *Parker, W. K. 1866b. *Caprimulgus* & *Cardinalis*. Parker, W. K. 1879b. *Casuarii*. *Parker, W. K. 1866b. *Corvus*. *Parker, W. K. 1872, 1879b. *Cotyle*. Schablowaskaja, V. G. 1925. *Cypselus* & *Dicholophus*. Parker, W. K. 1879b. *Dinornis* & *Dromaeus* [Dromiceius]. *Parker, W. K. 1866b. *Gallus*. (Crested fowl.) Klatt, B. 1910; *Parker, W. K. 1869, 1879b. *Gavia*, *Gymnorhina*, *Gyps*, *Linota*, & *Megalaema*. Parker, W. K. 1879b. *Notornis* & *Palapteryx*. *Parker, W. K. 1866b. *Picidae*. Parker, W. K. 1875. *Ratitae*. Parker, W. K. 1865b. *Rhea*. *Parker, W. K. 1866b. *Scythrops* & *Strigidae*. Parker, W. K. 1879b. *Struthio*. *Parker, W. K. 1866b. *Sturnus*. Parker, W. K. 1879b. *Tinamus*. *Parker, W. K. 1866b. *Tinnunculus*. Schablowaskaja, V. G. 1925. *Troglodytes*. Parker, W. K. 1879b. *Yungidae*. Parker, W. K. 1875.

Asymmetry of skull. *Strigidae*. *Shufeldt, R. W. 1900c. *Strix*. Collett, R. 1871.

Elongation of face. *Apteryx* & *Numenius*. Parker, W. K. 1888a.

Important labeling of lateral view figure. *Grandala*. *Pycraft, W. P. 1927.

Measurements. *Cygnus*. Pelerin, W. G. 1839.

Taxonomic consideration. Cornay, J. E. 1844a; Heerwagen, A. 1889. *Attagis*. Garrod, A. H. 1877c. *Ceryle alcyon*. Shufeldt, R. W. 1884b. *Charadriiformes*. Lowe, P. R. 1915b, c, 1916b. *Falconiformes*. Brandt, J. F. 1853. *Grandala*. *Pycraft, W. P. 1927. *Passeres*. Garrod, A. H. 1876g. *Thinocorus*. Garrod, A. H. 1877c.

Variation. *Strigiformes*. Kleinschmidt, O. 1901, 1902.

Bones and other structures of skull

The brain-case bones are fused in adult birds.

General. Includes birds. Lavocat, A. 1891. *Balaeniceps rex*. Parker, W. K. 1862b.

Extra elements. *Alauda*. Maggi, L. 1899. *Meleagris*. Staurengi, C. 1907. *Psittacidae*. Mivart, St. G. 1895b; Rousseau, L. F. 1839.

Fontanelles. Birds incidental. Pucioni, N. 1908. *Anser*. Staurengi, C. 1896. *Columba*, *Gallus*, & *Meleagris*. Staurengi, C. 1900b. *Athene*, *Elaphes*, *Strix*, & *Syrnium*. Staurengi, C. 1913-14.

Homologies. Include birds. Chapman, H. C. 1894; Kesteven, H. L. 1926a, c. Birds incidental. Gregory, W. K. & Adams, L. A. 1915.

Mesopterygoid bone. Pycraft, W. P. 1898d.

Metameric composition. Lavocat, A. 1863. Includes *Gallus*. Belogolowy, J. A. 1911. *Struthio*. Lavocat, A. 1861.

Os interparietale. *Anser*. Staurengi, C. 1896. *Columba* & *Strix*. Staurengi, C. 1900b. *Meleagris*. Staurengi, C. 1900b, 1907.

Sutures. Birds incidental. Pucioni, N. 1908.

BEAK REGION

Structure. Hesse, E. 1907b. Many species. Aeby, C. T. 1873.

Large rounded bosses on palate and mandible for crushing food. *Coccothraustes*. Pycraft, W. P. 1905c, e.

Maxilla and premaxilla. *Scelopacidae*. Shufeldt, R. W. 1893d.

Maxillo-palatines. *Tachycineta*. Shufeldt, R. W. 1887e.

Zygomatic arch. Includes birds. Gaupp, E. W. 1894.

Hyoid apparatus

Books. Text in German. Gadow, H. 1891d; Humboldt, F. H. 1806. Birds incidental. Rathke, M. H. 1832.

General. *Baudrimont, A. E. & Saint-Ange, M. 1854; Huxley, T. H. 1867. Many species. Borrichius, O. 1673a; Lucas, F. A. 1897c; *Nitzsch, C. L. & Giebel, C. G. 1858; Parker, W. K. 1866a, 1879b; Ricchiardi, S. 1860, 1876; Schenkling-Prévôt, C. 1894. Include birds. *Duvernoy, G. L. 1835a, 1836; Fürbringer, M. 1922; *Gaupp, E. 1905; Geoffroy St. Hilaire, E. 1820a; Lavocat, A. 1862a, 1883a, b.

Anas. Geoffroy St. Hilaire, E. 1832. *Ardea*. Muralto, J. 1683b. *Campothera*. Steinbacher, J. 1935. *Caprimulgidae*. Selater, P. L. 1866a. *Casuarus*. Thébault, V. 1891. *Ciconia*. Geoffroy St. Hilaire, E. 1832. *Cochleariidae*. Murie, J. 1872b. *Coracias*. Sharpe, R. B. 1871. *Corvus*. S., —. 1854. *Cygnus*. Lachmund, F. 1676b. *Dendropicus*. Steinbacher, J. 1935. *Eurypygidae*. Murie, J. 1872b. *Falconidae*. Greschik, J. 1928. *Fringilla*. S., —. 1854. *Garrulus*. Geoffroy St. Hilaire, E. 1832. *Leptosoma*. Selater, P. L. 1865c. *Microglossus*. Geoffroy St. Hilaire, E. 1823c. *Megascops*. Geoffroy St. Hilaire, E. 1832. *Nanodes discolor* & *Nestor meridionalis*. Mivart, St. G. 1896b. *Parus*. S., —. 1854. *Passer*. Greschik, J. 1918a. *Passeres*. Gadow, H. F. 1883. *Phaethon*. Brandt, J. F. 1840b. *Picus viridis*. Huber, V. A. 1821. *Prunella*. Greschik, J. 1918a. *Psittaci*. Mivart, St. G. 1895a; *Mudge, G. P. 1902. *Pseudocalypomena*. Lowe, P. R. 1931. *Regulus*. Greschik, J. 1918b. *Rhea*. Gadow, H. F. 1889a. *Rhinochaetes jubatus*. Marshall, W. A. 1870. *Rhinocetidae*. Murie, J. 1872b. *Struthio*. Gadow, H. F. 1889a. *Tetrao u. urogallus*. Hellmann, A. 1853a. *Thripas*. Steinbacher, J. 1935. *Trochilidae*. Geoffroy St. Hilaire, E. 1938; Lucas, F. A. 1892b.

Development. Many species. Parker, W. K. 1866a, 1879b. *Anas boschas* & *Passer*. Kallius, E. 1905.

Nomenclature. Lucas, F. A. 1899a.

Extension of horns of hyoid apparatus and tongue muscles to one orbit

General. *Iynx*. Coiter, V. 1575. *Picumnus*. Osmaston, B. B. 1902. *Picus*. Blumenbach, J. R. 1779-80 [Handbuch der Naturgeschichte]; Coiter, V. 1575; Huber, V. A. 1821; La Hire, P. 1730. *Pyrhopicus*. Osmaston, B. B. 1902.

Right nasal cavity. *Picus*. Lindahl, J. 1879. *Pyrhopicus*. Osmaston, B. B. 1902.

Mandible

General. Birds incidental. Gaupp, E. W. 1911, 1913. Psittacidae. Jacquemin, E. 1840b.

Function of mandible. Includes *Columba*. Winslow, J. B. 1745.

Meniscus of articulation. *Anas*. Fuchs, H. 1909.

Development

General. Includes birds. Fuchs, H. 1909. *Columba* & *Gallus*. Schenk, F. 1897, 1898. *Tinnunculus*. Sushkin, P. P. 1896b.

Development of Meckel's cartilage. Lebedinsky, N. G. 1916. Book. Text in French. Includes birds. Albrecht, P. C. 1886a.

Morphological value of mandibular ossification. Book. Text in French. Includes birds. Albrecht, P. C. 1886a.

Elements

General. Many species. Nitzsch, C. L. 1815. *Gallus*. *Voit, M. 1924.

Excellent figures. Includes birds. Fuchs, H. 1909.

Os articulare. Peters, W. K. 1869.

Os goniale. Includes birds. Voit, M. 1923. *Gallus*. Voit, M. 1924.

Nasal bones

General. *Gallus*. Oken, L. 1818.

Comparative discussion. Many species. Garrod, A. H. 1873d.

Palate

General. Aegithognathae. Pycraft, W. P. 1901a. Icteridae. Wetmore, A.

1919c. Neognathae. *Pycraft, W. P. 1901b. Trogonidae. Forbes, W. A. 1881c.

Saurogathism. Pici. Shufeldt, R. W. 1891c.

Structure. O'Donoghue, C. H. 1913.

OCCIPITAL REGION

General. Includes birds. Lavocat, A. 1883a.

Basisphenoid. Ossification centers. Birds incidental. Sutton, J. B. 1884.

Occipital condyle. Homologies. Includes birds. Calori, L. 1893.

Development

Cartilago acrochordalis. Jäger, J. 1926.

Segmentation. Jäger, J. 1926.

Occipital style

General. *Phalacrocorax*. Jeffries, J. A. 1883g, h; Shufeldt, R. W. 1884c. *Phalacrocorax bicristatus*. Shufeldt, R. W. 1883b.

Occipital style of *Phalacrocorax* an ossification of attachment of temporal muscle. Jeffries, J. A. 1884.

ORBITAL REGION

General. *Anser*, *Corvus*, *Gallus*, & *Meleagris*. Barkard, O. 1902.

Os infraorbitale (uncinatum). Musophagidae. Reinhardt, J. T. 1871, 1873a.

Os supraorbitale and os infraorbitale. Ratitae. Gruber, W. 1852.

Postorbital plate. Shufeldt, R. W. 1888g.

Supraorbital ossicles. Arboricolae. Wood-Mason, J. 1874.

Lacrymal bone

General. Ratitae. Gruber, W. 1852.

Evolution. Includes birds. Gregory, W. K. 1920.

QUADRATE BONE

General. Garbiglietti, A. 1857; Peters, W. K. 1867a. Many species. Walker, M. 1888.

Use in taxonomic classification. Lowe, P. R. 1926a.

TEMPORAL REGION

General. Include birds. Lavocat, A. 1881, 1882.

Homologies. Includes birds. Hol-lard, H. 1864.

Parietal bone. Double. *Pygoscelis*. Pycraft, W. P. 1907i.

Relations to reptilian skull. Bittner, F. 1912.

Streptostyly. Include birds. Ver-sluys, J. 1910, 1912.

Temporo-submaxillary region. Includes birds. Lavocat, A. 1887.

Ear region

Book. Text in French. Birds incidental. Albrecht, P. C. 1886a; Peters, W. K. 1867a.

General. Geoffroy St. Hilaire, E. 1820a. Birds incidental. Bender, O. 1910.

Bony labyrinth. Strigidae. Shu-feldt, R. W. 1900c.

Cavum suprasemicirculare. Shindo, T. 1930.

Development. Includes birds. Peters, W. K. 1867b.

Epiotic region. Parker, W. K. 1862b.

Otic elements. Include birds. Baur, G. 1889; Peters, W. K. 1869.

Position of ear. *Haematopus*, *Lomvia*, *Scolopax*, & *Sula*. Pycraft, W. P. 1908c.

Small bones. Steganopodes [Pelecani-formes]. Brandt, J. F. 1836. Swim-ming birds. Brandt, J. F. 1837b.

Tympanic cavity. *Columba*, *Corvus*, *Gallus*, & *Strix*. Platner, F. 1839.

Canals of skull

General. Kesteven, H. L. 1926c.

Air-conducting canal from ear to mandible. Jacquemin, E. 1840a.

Foramina

General. Kesteven, H. L. 1926c.

Auditory apertures. Strigidae. Far-rar, W. 1831.

Good, well-labeled figures showing foramina. Weber, M. I. 1824.

NERVE FORAMINA

General. *Malacarne, V. 1782. Meleagridae. Shufeldt, R. W. 1914b.

Good figures. Halbertsma, H. J. 1862.

Foramina for Nn. IX, X, XII. Columbae. Shufeldt, R. W. 1901d. Corvidae & Icteridae. Shufeldt, R. W. 1888f. *Podasocys montanus*. Shu-feldt, R. W. 1884a. *Sturnella*. Shu-feldt, R. W. 1888f.

Fossae

General. *Malacarne, V. 1782.

Nasal fossae. Chatin, J. 1885.

Pneumaticity of skull

Book. Text in Latin. *Meleagris*. Schlemm, F. 1834.

General. Bignon, F. 1887, 1888b; Mihálikovics, G. V. 1896; Moulen, A. 1694. Includes birds. Gebhardt, F. A. 1901. Many species. Marshall, W. A. 1872b. *Columba*. Müller, B. 1907; Strasser, H. 1905. *Fringilla* [*Serinus*] *canaria*. Ruhwandl, G. 1916.

Beak. Hesse, E. 1907b.

Development. *Columba*. *Lurje, M. 1906.

SMELL

See also under Brain and Olfactory organs. This section includes mostly publications dealing with the disputed olfactory sense. Scent of birds is included also.

Books. Text in English. Include birds. Kenneth, J. H. 1924; Wash-burn, M. F. 1926.

Text in German. Naumann, J. A. 1820-47; Plate, L. H. 1924. Include birds. Hempelmann, F. 1926; Henning, H. 1924.

General. Bachman, J. 1834; Fabani, C. 1896b; Gurney, J. H. Jr. 1922a; Meek, A. 1922; Osmaston, B. B. 1909a; Palmer, C. W. 1923; Schwartz, M. 1908; Turner, C. H. 1892; Williams, C. B. 1922b; Anon. 1922a. Many species. *Ishihara, K. 1932; Reeker, H. 1899. Includes birds. Edinger, L. 1908a. Carrion birds. Morris, F. O. 1837.

Anatidae. Nolte, W. 1927b. *Anser*. Best, M. G. & Haviland, M. D. 1913b.

Apteryx. Benham, W. B. 1906b; Schaff, E. A. 1892. *Cathartes*. Barrows, W. B. 1887; Hopkins, C. L. 1887, 1888; Hunter, P. 1830, 1833; Leighton, A. H. 1928; Owen, R. 1837; Rhoads, S. N. 1883; Sayles, I. 1887; Sells, W. 1837; Strong, R. M. 1908. *Cathartidae*. Beebe, C. W. 1909c; Hoxie, W. 1887c, d. *Columba*. Raspail, X. 1899c; Rouse, J. E. 1905. *Dacelo*. Pocock, R. I. 1912. Includes *Gallus*. Köhler, W. 1915. *Meleagris*. Caton, J. D. 1870. *Oedienemus o. oedienemus*. Penrose, F. G. 1913. *Passer*. Liszt, E. 1917. *Perdix*. Raspail, X. 1899c. *Phalacrocorax*. Ewart, J. C. 1882. *Phasianus*. Raspail, X. 1899c. *Rhamphastos*. Traill, T. S. 1815. *Sarcophamphus gryphus*. Gill, E. L. 1904. *Streptopelia*. Strong, R. M. 1908. *Struthio*. G., T. H. 1922. *Vultur* [*Cathartes*] *aura*. Audubon, J. J. 1826, 1833; Waterton, C. 1832c, 1833c, e. *Vulturinae*. Hutton, T. 1837; Reiser, O. 1911.

Absence of scent in brooding birds. Tegetmeier, W. B. 1905.

Comparison of sense of smell with vision. Includes birds. Schuster, W. 1905a. *Cathartes aura septentrionalis*. Lewis, J. B. 1928.

Olfactory sense lacking in vultures. Sight used. Adams, A. L. 1858; Hadfield, H. 1875.

Reaction to strong-smelling insects. Osmaston, B. B. 1909a.

Relation of olfactory sense to soaring flight. McKechnie, W. E. 1923.

Weak olfactory sense. Dieulafé, L. 1904.

EXPERIMENTAL STUDIES OF SENSE OF SMELL

Book. Text in English. *Gymnogyps*. Darwin, C. R. 1878.

General. *Acanthis*, *Anas*, *Asio*, *Carduelis*, *Corvus*, *Fringilla*, *Perdix*, & *Pyrrhula*. *Soudek, S. 1925. *Streptopelia*. *Strong, R. M. 1911b. *Strix* & *Turdus*. *Soudek, S. 1925. *Vultur* [*Cathartes*] *aura*. Audubon, J. J. 1826, 1833.

Behavior of birds in maze. Sadvinkova, M. P. 1923b.

Negative results. *Vultur* [*Cathartes*] *aura*. Waterton, C. 1833c, e.

Smell in decerebrate birds. *Columba* & *Gallus*. Schrader, M. E. 1891.

SOCIAL RELATIONS

See also under **Behavior, Ecology, and Habits**.

Books. Text in English. Includes birds. Allee, W. C. 1931. *Sphenisciformes*. Antarctica. Levick, G. M. 1914.

Text in French. Berthoud, S. H. 1891; Espinas, A. V. 1878.

Text in German. Deegener, P. 1918.

General. Grosseteste, W. 1911; Horst, L. 1910; Katz, D. 1926; *Lorenz, K. 1935; Momber, G. A. 1909; Peiter, W. 1908; Sherman, A. R. 1924. Many species. *Schjelderup-Ebbe, T. 1922d, 1924d, e.

Acridotheres tristis. Stoner, D. 1923b. *Anatidae*. Griscom, L. 1922. *Ciconia*. Schultze, S. 1677. *Columba*. Masure, R. H. & Allee, W. C. 1934; Taylor, W. S. 1932; Whitman, C. O. 1919a. *Corvidae*. Lorenz, K. 1931. *Fringillidae*. Braun, F. 1900b. *Gallus*. Katz, D. & Toll, A. 1923; Masure, R. H. & Allee, W. C. 1934; *Schjelderup-Ebbe, T. 1922a, 1923e. *Larus*. Herrick, F. H. 1912. *Larus argentatus*. Lucas, F. A. 1892a; Strong, R. M. 1914. *Larus r. ridibundus*. Stadie, R. 1929. *Leucosticte tephrocotis littoralis*. Shaw, W. T. 1936. *Meleagris* & *Pavo*. Schjelderup-Ebbe, T. 1932. *Psittiparus*. Miller, R. C. 1921a, b, 1922. *Troglodytes aëdon*. Sherman, A. R. 1925a, b, c.

Communal display. *Trochilidae*. Nicholson, E. M. 1931a.

Defense reactions of colonies. Deschiens, R. 1918.

Hostility between species. *Buteo* & *Corvus*. Fisher, W. H. 1888c. *Corvus* & *Falco*. Detmers, E. 1906. *Passer*. Biedermann-Imhoof, R. 1913b.

Migrating birds. Whittle, C. L. 1926.

Mobbing of cuckoos and hawks. Moffat, C. B. 1911.

Recognition marks in certain species. Nichols, J. T. 1912.

Roosting. *Colaptes cafer collaris*. Stoner, E. A. 1922b. *Corvus*. Townsend, C. W. 1918.

Signaling with tails. Seton, E. T. 1921b.

Social control. Columbæ. Craig, W. 1909b.

Social parasitism. Friedmann, H. 1930c. Book. Text in English. *Agelaioides*, *Molothrus*, & *Tangavius*. *Friedmann, H. 1929.

Synchronous action. Tyler, W. M. 1915.

DESPOTISM

General. Schjelderup-Ebbe, T. 1924a. Many species. *Schjelderup-Ebbe, T. 1924d. *Gallus*. *Schjelderup-Ebbe, T. 1923d, 1924e. *Meleagris* & *Pavo*. Schjelderup-Ebbe, T. 1932.

Pecking order. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938.

FEEDING AND BROODING YOUNG BY OTHER INDIVIDUALS THAN PARENTS

General. *Columba*. Snell, F. H. 1857b.

Birds as foster mothers. Ufer, W. 1906.

Captive birds fed by free members of species. *Strix*. M'Gowan, W. 1903. *Syrnium aluco*. Witzlsteiner, P. 1911.

Wounded bird cared for by another of same sex. Milne-Edwards, A. 1899. Wounded bird fed by its mate. *Falco*. Bahr, P. H. 1908b.

GREGARIOUSNESS, INCLUDING FLOCKING

Book. Text in English. Includes birds. Allee, W. C. 1931.

General. Allee, W. C. 1923; Machon, F. 1878; Miller, R. C. 1922; Sherman, A. R. 1924; Widmann, O. 1896. Many species. Whittle, C. L. 1923. Includes birds. Allee, W. C. 1934. Shore birds. Nichols, J. T. 1931.

Astragalinus, *Bonasa*, *Branta*, & *Capodacus*. Whittle, C. L. & Fletcher, L. B. 1924. *Chaetura pelagica*. Witchell, C. A. 1896c. *Colinus* & *Columba*. Whittle, C. L. & Fletcher, L. B. 1924; Masure, R. H. & Allee, W. C. 1934. *Corvus*. Townsend, C. W. 1918. *Falcones*. Trowbridge, C. C. 1895. *Gallus*. Masure, R. H. & Allee, W. C. 1934. *Junco*. Whittle, C. L. &

Fletcher, L. B. 1924. *Nephoecetes niger borealis*. Rathbun, S. F. 1925. *Otocoris*. Sutton, G. M. 1927a. *Passer*. Miller, R. C. 1921b. *Passerherbulus* & *Penthestes*. Whittle, C. L. & Fletcher, L. B. 1924. *Psaltiriparus*. Miller, R. C. 1921a, b. *Sturnus*. Savage, E. U. 1922. *Zonotrichia*. Whittle, C. L. & Fletcher, L. B. 1924.

Mixed flocks. Stresemann, E. 1917c; Swynnerton, C. F. 1915b.

TERRITORIALISM

Domination of a restricted area by a pair of breeding birds.

Books. Text in English. Coward, T. A. 1920; Dixon, C. 1897a; Howard, H. E. 1935; Nice, M. M. 1933d; Willughby, F. 1676. Many species. Howard, H. E. 1920; Nicholson, E. M. 1927. *Agelaioides*. Friedmann, H. 1929. *Corvus f. frugilegus*. Yeates, G. K. 1934. *Cuculus*. Chance, E. P. 1922. *Molothrus*. Friedmann, H. 1929. *Phalacrocorax a. auritus*. Lewis, H. F. 1929. *Phasianidae*. Beebe, C. W. 1926. *Sylvidae*. Howard, H. E. 1907-15. *Tangavius*. Friedmann, H. 1929.

Text in German. Altum, B. 1868; Heinroth, O. & Heinroth, M. 1924-28; Naumann, J. F. 1905.

Text in Italian. Olina, G. P. 1684.

General. Adams, C. C. 1908b; Alexander, C. J. & Alexander, H. G. 1909; Alexander, H. G. 1921; Brewster, W. 1906; Burkitt, J. P. 1919, 1922; Butts, W. K. 1927; Craig, W. 1918; Gröbbels, F. 1907; Lorenz, K. 1935; Moreau, R. E. & Moreau, W. M. 1928; Nice, M. M. 1934a; Nicholson, E. M. 1930; Ritter, W. E. & Bensen, S. B. 1934; Tinbergen, N. 1936.

Agelaius phoeniceus. Allen, A. A. 1914b. *Asio f. flammeus*. Goddard, T. R. 1935. *Colymbus septentrionalis*. Selous, E. 1912b. *Corvidae*. Lorenz, K. 1931. *Corvus corone*. Selous, E. 1912a. *Dendroica c. caerulescens*. Nice, M. M. 1930d. *Dendroica coronata*. Nice, M. M. 1930c. *Dendroica magnolia*. Nice, M. M. 1926. *Dendroica v. virens*. Nice, M. M. 1932c. *Dumetella carolinensis*. Gill, G. 1935. *Erethacus*. Burkitt, J. P. 1924. *Euplectes h. hordeacea*. Lack, D. 1935. *Gallus*. Schjelderup-Ebbe, T. 1922a, b. *Haematopus o. ostralegus*. Dewar, J. M. 1915a. *Lanius*. Miller, A. H. 1931. *Larus argentatus*. Herrick, F. H. 1912;

Strong, R. M. 1914; Ward, H. L. 1906a, b. *Melospiza*. Nice, M. M. 1930e, 1931c, e, 1933b, c, e, 1934c. *Mimus*. Michener, H. & Michener, J. R. 1935. *Nycticorax n. hoactli*. Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Phylloscopus trochilus*. Brock, S. E. 1910b. *Podiceps [Colymbus] c. cristatus*. Venables, L. S. & Lack, D. 1934. *Poliophtila c. caerulea*. Nice, M. M. 1932a. *Sylvia undata dartfordiensis*. Venables, L. S. 1934. *Telmatodytes p. palustris*. Welter, W. A. 1935. *Topaza pella*. Nicholson, E. M. 1931b. *Trochilidae*. Woods, R. S. 1927. *Troglodytes a. aëdon*. Baldwin, S. P. 1921a; Baldwin, S. P. & Bowen, W. W. 1928; Brooks, A. 1925a; Creaser, C. W. 1925. *Vanellus vulgaris*. Brock, S. E. 1911. *Zonotrichia albicollis*. Baldwin, S. P. 1921b.

Return of breeding pair in migrations to same territory. Taylor, F. C. 1886.

"Singing tree" in a bird territory. Mousley, W. H. 1919.

Size of territory. Friedmann, H. 1933b.

Struggle for existence in India. Book. Text in English. Dewar, D. 1925.

Theory of territorialism and its development. Book. Text in English. Nice, M. M. 1933d.

Variation in song as criterion of constancy in territory or locality. Promptov, A. N. 1927.

Which sex selects nesting locality? Many species. Mousley, W. H. 1921b.

SOUND PRODUCTION

This division includes publications referring to any sounds made by birds. For the chief organ of voice see under *Syrinx*. See also under *Behavior* and *Habits*.

SOUND PRODUCTION NOT INVOLVING THE SYRINX

Drumming with beak. *Ceophloeus*. Vickers, E. W. 1914.

During mating period. Russow, V. 1871.

Vibrating sounds. *Dendrocopos minor*. Lewis, S. 1901.

Volplaning. *Chordeiles*. Hartman, F. A. 1914; Miller, A. H. 1925; Witchell, C. A. 1896c.

VOICE

This section includes all sounds made by the vocal organs of birds, including those usually classed as song.

Books. Text in English. Blanchan, N. 1898; Chapman, F. M. 1912b; Dixon, C. 1897a; Evans, W. E. 1851; Garstang, W. 1922; Howard, H. E. 1920; Hudson, W. H. 1920a; Priest, C. D. 1933; Rennie, J. 1831. *Botaurus*. Townsend, C. W. 1912b. *Menura*. Littlejohns, R. T. 1933. Includes *Sturnus vulgaris*. Bready, M. B. 1929. *Turdidae*. Seebohm, H. & Sharpe, R. B. 1898-1902.

Text in French. Lescuyer, J. F. 1878b.

Text in German. Barkow, H. C. 1871; *Haecker, V. 1900; Schmitt, C. & Stadler, H. 1919b; Schuster, W. 1906c; Voigt, A. 1905. Includes *Anas*, *Mergus*, & *Turdus*. Müller, J. P. 1839b. Bird song in Greek classics. Pischinger, A. 1901.

Text in Latin. Aldrovandus, U. 1610-13.

General. Abbott, C. C. 1876b; Allen, F. H. 1922; Altum, B. 1875b; Bassett, F. N. 1921a; Blackwall, J. 1824b, 1850; Braun, F. 1908c, 1909, 1910, 1919, 1923a; Bretscher, K. 1918a; Clark, X. 1879; Coupin, H. 1901; Gröbbels, F. 1908c, 1911a, b; Heinrich, O. 1924b; Krasser, F. 1871; Krompecher, O. 1921; Lucas, F. A. 1904; Noll-Tobler, H. 1920; Olds, H. W. 1917; Otto, K. 1872; Parrot, C. P. 1903; Peake, E. 1926; Plączek, B. 1884, 1908; Savart, F. 1826; Scott, W. E. 1902c; Stadler, H. & Schmitt, C. 1914a, b; Stewart, S. A. 1871; Titchener, E. B. 1893; Voigt, A. 1907, 1911; White, W. H. 1836b. Many species. *Paolucci, L. 1877; Vallon, G. 1896. Include birds. Clark, A. H. 1926; Fabani, C. 1894b; Seemann, W. 1898. Nocturnal migrating birds. Tyler, W. M. 1916. Tropical birds. Fuertes, L. A. 1916.

AMERICA

North America

General. Bent, A. C. 1919, 1921, 1922, 1923, 1925, 1926, 1927, 1929, 1932, 1937.

Eastern North America. Bicknell, E. P. 1884. Book. Text in English. Chapman, F. M. 1912b.

Arkansas. Baerg, W. J. 1930, 1931.
California. Trochilidae. Woods, R. S. 1927.

New York. Long Island shore birds. Nichols, J. T. & Harper, F. 1916.
Oneida Lake region. Stoner, D. 1932.

Pennsylvania. Wissahickon Hills. Book. Text in English. Weygandt, C. 1930.

South America

Galapagos Islands. Snodgrass, R. E. & Heller, E. 1904.

Oceanic islands. Book. Text in English. Murphy, R. C. 1936.

West Indies

Trinidad. Chapman, F. M. 1892.

EUROPE

British Isles. Newman, H. W. 1862. Book. Text in English. Morris, S. 1925.

France. Berthelot, S. 1869.

Germany. Braun, F. 1899b; Hermann, R. 1899. Migrating birds. Hortling, I. J. 1926; Weinland, D. F. 1861b, 1862b.

VARIOUS BIRDS

Acanthis. Stadler, H. 1927b. *Age-laius*. Allen, A. A. 1914b. *Aimophila aestivalis bachmani*. Strong, R. M. 1918b. *Alauda arborea*. Skovgaard, P. 1923b. Anatidae. Finn, F. 1900b. Anserinae. Christoleit, E. 1929. *Antrostomus*. Bolles, F. 1912; Stoner, D. 1920. *Aquila glitchii*. Sushkin, P. P. 1896a. *Asio f. flammeus*. Dubois, A. D. 1924; Urner, C. A. 1923. *Bonasa*. Stockwell, G. A. 1888. *Buteo p. platypterus*. Burns, F. L. 1911. *Calopelia*. Butler, A. G. 1906f. *Campephilus principalis*. Kennard, F. H. 1915b. *Capella delicata*. Sutton, G. M. 1923. *Caprimulgus europaeus*. Heinroth, O. 1909a. *Carpodacus*. Bergtold, W. H. 1914. *Casuaris*. Rothschild, W. 1901. *Charadrius melodus circumcinctus*. Pickwell, G. B. 1925b. *Charadrius* [*Squatarola*] *squatarola*. Mackay, G. H. 1892b. *Chasmorhynchus*. Quelch, J. J. 1892. *Cinclus*. Ehinger, C. E. 1930. *Coccyzus*. Clute, W. N. 1893. *Colaptes auratus*. Burns, F. L. 1900; Noble, G. K. 1936. *Colinus*. Cheney, J. V. 1890. Columbidae.

Whitman, C. O. 1919a. Columbig-formes. Craig, W. 1904. *Colymbus*. Dubois, A. D. 1919. Compothlypidae. Jones, L. 1900. *Corvus c. corax*. Stadler, H. 1927a. *Corvus corone*. Meise, W. 1928. Cuculidae. Ihering, H. 1914a. *Cuculus canorus*. Ramsbotham, R. H. 1906. *Cyanopiza*. Cheney, J. V. 1890. *Cygnus*. Robinson, H. W. 1913e. *Dendroica c. caerulescens*. Nice, M. M. 1930d. *Dendroica kirtlandi*. Leopold, N. F. 1924. *Dendroica v. virens*. Nice, M. M. 1932c. *Dendroica magnolia*. Nice, M. M. 1926. *Diomedea*. Fisher, W. K. 1904a. Drepanididae. Perkins, R. C. 1901. *Dumetella carolinensis*. Whittle, H. G. 1920. *Ectopistes*. Craig, W. 1909a, 1913b. *Emberiza citrinella*. Hoffmann, B. 1922. *Empidonax trailii*. Farley, J. A. 1901; Mousley, W. H. 1931. *Falco mexicanus*. Tyler, J. G. 1923. *Gallinula*. Brewster, W. 1891. *Gallus*. Schjelderup-Ebbe, T. 1913, 1923d, 1924b. *Haliaeetus leucocephalus*. Herrick, F. H. 1932. *Ionornis martinicus*. Gross, A. C. & Van Tyne, J. 1929. *Lampronessa spona*. Heinroth, O. A. 1910a. *Lanius*. Miller, A. H. 1931. *Larus*. Blake-Knox, H. 1867b. *Larus argentatus*. Strong, R. M. 1914. *Leucosticte tephrocotis littoralis*. Shaw, W. T. 1936. *Meleagris*. Stockwell, G. A. 1888. *Melopelia*. Wetmore, A. 1920f. *Mergus*. Christoleit, E. 1927a. *Mimus*. Michener, H. & Michener, J. R. 1935. *Myiochanes virens*. Craig, W. 1933. *Nycticorax n. hoactli*. Gross, A. O. 1923a; Noble, G. K., Wurm, M., & Schmidt, A. 1938. *Oceanodroma l. leucorhoa*. Townsend, C. W. 1924c. *Opisthocomus*. Beebe, C. W. 1909b. *Oporornis agilis*. Huff, N. L. 1929. *Oreophasis derbianus*. Blake, E. R. 1936b. *Oxyechus v. vociferus*. Pickwell, G. B. 1925a. *Paradisea minor*. Ogilvie-Grant, W. R. 1905c. *Passerella iliaca*. Linsdale, J. M. 1928c. *Passerherbulus caudatus*. Peabody, P. B. 1901. *Phaethornis*. Davis, T. A. 1934. Picidae. Crabb, E. D. 1930. *Porzana jamaicensis*. Allen, J. A. 1900b. *Puffinus opisthomelas*. Anthony, A. W. 1896a. *Pygmornis*. Davis, T. A. 1934. *Pyrrhula p. germanica*. Hoffmann, B. 1926. Rallinae. Brewster, W. 1901. *Ramphastos brevicarinatus*. Van Tyne, J. 1929. *Seiurus aurocapillus*. Nice, M. M. 1931d. *Speotyto cunicularia*. Kennard, F. H. 1915a. *Spiza americana*. Gross, A. O. 1921. *Spizella pusilla*. Saunders, A. A. 1922b.

Strigidae. Matthews, A. 1880. *Sturnella*. Baskett, J. N. 1896. *Sturnus vulgaris*. Froggatt, W. W. 1912. *Sula* [Moris] *bassana*. Cunningham, R. O. 1866. *Sylvia*. Anzinger, F. 1893b. *Telmatodytes p. palustris*. Welter, W. A. 1935. *Tetrao*. Stockwell, G. A. 1888. *Tetrao urogallus*. Graff, L. 1885. *Turdus iliacus*. Matthews, A. 1880. *Turtur* [*Streptopelia*] *risorius*. Craig, W. 1909a. *Tyrannus tyrannus*. Hausman, L. A. 1925. *Vermivora chrysoptera*. Jacobs, J. W. 1904. *Vireo*. Cheney, J. V. 1890. *Vireo b. belli*. Nice, M. M. 1929a. *Vireo philadelphicus*. Brewster, W. 1903; Dwight, J. 1897; Lewis, H. F. 1921. *Zenaidura*. Craig, W. 1909a. *Zonotrichia*. Downer, E. D. 1899. *Zonotrichia querula*. Nice, M. M. 1929b; Semple, J. B. & Sutton, G. M. 1932.

Biological significance of bird voice. *Gröbbels, F. 1925a.

Booming. *Botaurus*. Torrey, B. 1889, 1890.

Cackling of hens. *Gallus*. Ball, V. 1891; Kellerman, W. A. 1893. *Gallus bankiva*. Romanes, G. J. 1891.

Crow of cock in early morning. *Gallus*. Hottinger, R. 1926.

"Neighing" or humming noise. *Gal- linago g. gallinago*. Meves, F. W. 1858.

Origin of bird voice. *Luscinia* & *Serinus*. Duncker, H. 1922.

Relation to temperament. Braun, F. 1917b.

Social significance of bird voice. Columbiformes. Craig, W. 1909b.

Strength of voice. *Alauda* & *Cuculus*. Deditius, K. 1900.

Ventriloquial power and imitation. Fish, E. E. 1881.

Vocal organs. The chief organ of voice in birds is the syrinx. See also under *Syrinx*. Cuvier, G. L. 1800a. *Botaurus lentiginosus*. Maynard, C. J. 1891h. Book. Text in German. *Cygnus* & *Grus*. Barkow, H. C. 1871.

"Vocal sac." *Struthio*. Photograph. Anon. 1901b.

Analyses, description and recording of bird voice

General. *Fénis, F. 1917; Hegemann, F. 1895; Hunt, R. 1923; Landois, H.

1894b; Moore, R. T. 1915; Rowan, W. 1924; Saunders, A. A. 1915, 1924b; Strong, R. M. 1918a; Summers, E. 1916; Voigt, A. 1894a; Witchell, C. A. 1892a. *Melospiza melodia*. Wheeler, W. C. & Nichols, J. T. 1924.

An ingenious and useful system of diagrams is employed. Birds of North-eastern United States. Book. Text in English. *Saunders, A. A. 1935.

Apparatus and methods for recording bird voice

General. Brand, A. R. 1932; Jones, H. B. 1926.

Graphic method. Saunders, A. A. 1924b.

Sound photography records. Brand, A. R. 1935.

Strobophotography. Metfessel, M. 1934.

Use of stop watch. Craig, W. 1913a.

MUSICAL ANALYSES

General. Hornbostel, E. M. 1911; Olds, H. W. 1900; Riess, M. 1920. *Turdus merula*. Schmitt, C. & Stadler, H. 1919a.

Description using the diatonic scale

Books. Text in English. Cheney, S. P. 1892.

Text in German. Hoffmann, B. 1908. Many species. Schmitt, C. & Stadler, H. 1919b; Voigt, A. 1905.

General. *Fénis, F. 1917; Fowler, W. W. 1916; *Schmitt, C. & Stadler, H. 1913a. New Zealand birds. Andersen, J. C. 1909, 1918.

Cuculus. *Oppel, J. 1871. *Myiochanes*. Craig, W. 1933; Olds, H. W. 1904. *Passerella i. iliaca*. Moore, R. T. 1913. *Strigidae*. Landois, H. 1885b. *Turdus m. merula*. Oppel, J. 1871.

Development of voice

General. Braun, F. 1908c, 1920; Knauer, F. K. 1906b; Lüttschwager, H. 1918.

Birds reared in captivity. Butler, A. G. 1892.

Development in individual. Craig, W. 1902.

DEVELOPMENT OF SONG

General. *Melospiza*. Nice, M. M. 1933e. *Sturnella magna*. Scott, W. E. 1904d. *Zamelodia* [*Hedymeles*] *ludovicianus*. Scott, W. E. 1904c, d.

Experimental study of song development. Lucas, F. A. 1904.

Evolution of voice

General. Allen, F. H. 1919, 1923; Fowler, W. W. 1896; Grinnell, J. 1920b; Haecker, V. 1924b; Olds, H. W. 1902; Witchell, C. A. 1890.

Origin of song. Many species. Christoleit, E. 1924.

Imitation or mocking

See also under Behavior.

Book. Text in English. Dixon, C. 1897a.

General. Braun, F. 1908b; Cresswell, O. E. 1899. *Mimus*. Dickey, D. R. 1922.

List of birds imitated. *Mimus*. *Whittle, C. L. 1922a.

SPEECH

Books. Text in English. Page, C. N. 1906. Psittacidae. Russ, K. F. 1884, 1898.

Text in German. Russ, K. F. 1889. Psittacidae. Bungartz, J. 1902b; Denker, A. 1907.

General. Busch, M. 1877; Porter, J. P. 1910; Rhoads, S. N. 1889. *Chrysotis*. Lashley, K. S. 1913. Corvidae. Gerlach, W. 1927. Psittacidae. Braun, F. 1912b, 1923b; Kutorga, S. 1832; Raspail, X. 1903e; Schjelderup-Ebbe, T. 1930.

Comprehension of human speech. Psittacidae. Braun, F. 1911c.

Taught to speak in England and Greece. *Sturnus vulgaris*. Book. Text in English. Bready, M. B. 1929.

Physiology and physics of voice

General. *Rüppell, W. 1933.

Action of vocal organs including air sacs. Many species. Csörgy, T. 1922.

Acoustics of vocal organs of singing birds. Deditius, K. 1901, 1902a.

Function of esophagus in booming of *Botaurus*. Chapin, J. P. 1922.

Phonetic analysis. Fabiani, C. 1897.

Pitch. Schmitt, C. & Stadler, H. 1913b.

Range of voice. Vincent, S. B. 1914.

Psychological analysis

General. *Gröbbels, F. 1910; *Hoffmann, B. 1925.

Relation to temperament. Braun, F. 1917b.

Singing of birds

General. Braun, F. 1912a, c; Fabiani, C. 1894b; Graeser, K. 1907a; Hagen, W. 1908b. *Turdus iliacus*. Witchell, C. A. 1892c.

Acquisition of new songs. Scott, W. E. 1902a.

Aërial song. *Geothlypis*. Howe, R. H. 1898.

Aesthetic aspects. Anzinger, F. 1895; Schuster, W. 1908a.

Changes in song. Braun, F. 1911b.

Do birds practice their songs? MacLoughlin, A. E. 1927b.

Flight. Saunders, A. A. 1922a.

Inherited elements of bird song. Braun, F. 1915a; Witchell, C. A. 1892b. *Melospiza*. Nice, M. M. 1933e. *Sturnella magna*. Scott, W. E. 1904d. *Zamelodia* [*Hedymeles*] *ludovicianus*. Scott, W. E. 1904c, d.

Range in pitch. Witchell, C. A. 1898.

Rhythm. *Hylocichla*. Olds, H. W. 1916.

Sexual selection as a factor. Hawkins, C. J. 1918, 1920.

Significance. Kirkham, F. B. 1909; Lowe, P. R. 1909a; Stubbs, F. J. 1909b; Witchell, C. A. 1892a.

Undeveloped song in a specimen of *Melospiza*. Jewell, H. W. 1908b.

Unusual song. *Hylocichla*. Olds, H. W. 1913.

ENVIRONMENTAL EFFECTS ON
SONG IMPULSE

Better singing in far north. Gloger, C. W. 1859a.

Climate. Gloger, C. W. 1859a.

Light. *Troglodytes a. aëdon*. Lutz, F. E. 1931.

Temperature changes. Fowler, W. W. 1899. *Mimus*. Shaver, J. M. & Walker, G. 1930.

Weather. Alford, C. E. 1925; Braun, F. 1922; Davenport, H. S. 1899; *Schwan, A. 1920, 1921.

EXPERIMENTAL STUDY OF SONG

General. Barrington, D. 1773.

English sparrows reared by canaries. *Conradi, E. 1905.

LEARNING TO SING

Hand-reared birds. *Agelaius phoeniceus* & *Dolichonyx oryzivorus*. Scott, W. E. 1904b. *Sturnella magna*. Scott, W. E. 1904d. *Zamelodia* [*Hedymeles*] *ludovicianus*. Scott, W. E. 1904c, d.

Learned or inherited? Hagen, W. 1923. Many species. Christoleit, E. 1927b.

PERIODS OF SINGING

General. Alexander, C. J. & Alexander, H. G. 1908, 1911; Brimley, C. S. 1909; Gröbbels, F. 1908b. Many species. Baerg, W. J. 1930.

Autumn. Aplin, O. V. 1894a, 1897; Wittich, C. A. 1897. *Cinclus c. cinclus* & *Emberiza cirrus*. Swainson, E. A. 1904.

Evening. *Mimus*. Shaver, J. M. & Walker, G. 1930.

Mating. Saunders, A. A. 1922a.

Migration periods. Alexander, C. J. 1917b; Baxter, E. V. & Rintoul, L. J. 1914.

Nocturnal song. Edson, J. M. 1893. *Telmatodytes p. palustris*. Hunt, C. J. 1904b.

Seasonal changes. Correlation with period of singing. Böker, H. 1923a, b.

Twilight. *Myiochanes*. Craig, W. 1926, 1933. *Turdus*. Boubier, M. 1926a.

Winter. Alexander, C. J. 1917b.

SEASONAL DECLINE IN SINGING

General. Fry, H. J. 1916.

Ceases soon after mating in birds studied. Burkitt, J. P. 1919.

SPECIAL CONDITIONS FOR SINGING

Changes in captivity. Braun, F. 1911b.

During a thunder storm. Barrett-Hamilton, G. E. 1900. *Hedymeles ludovicianus*. MacLoghlin, A. E. 1927a.

Variation in bird voice

General. Dotterweich, H. 1925; Fabani, C. 1892b; Howard, H. E. 1902. *Leucosticte tephrocotis littoralis*. Shaw, W. T. 1936.

Individual variation. Olds, H. W. 1914; Saunders, A. A. 1924a.

Local variations. Many species. Lucanus, F. K. 1907b.

Variations as criterion for constancy in locality. Promptov, A. N. 1927.

Voice under special conditions

In captivity. Fringillidae. Book. Text in English. Butler, A. G. 1899.

In great pain. *Anas* & *Perdix*. Otto, H. 1909.

Young birds in eggs. Gloger, C. W. 1856e.

SPECIATION

The development of species. See also under Evolution and Taxonomy.

General. Braun, F. 1899e; Chandler, A. C. 1914a; Chigi, F. 1908; Grinnell, J. 1919; Hachisuka, M. 1926a; Lowe, P. R. 1915a, 1922; Meinertzhagen, R. 1921d; Ridgway, R. 1877; Schiebel, G. 1928. Many species. Scott, W. E. 1905. Includes birds. Gates, R. R. 1917. Birds incidental. Sumner, F. B. 1923.

Africa. Hartert, E. J. 1921.

Western Norway. Includes birds. Stejneger, L. H. 1907.

Anatidae. Panton, H. 1913. *Buarremon*. Chapman, F. M. 1923. *Buteo*. Stresemann, E. 1925d. *Carpodacus*. Grinnell, J. 1911b. *Columba livia dakhloe*. Moreau, R. E. 1930. *Coturnix*. Chigi, F. 1905. *Dryobates*. Stejneger, L. H. 1906. *Fringilla coelebs*. Gengler, J. 1917. *Galerida cristata brachyura* & *Galerida cristata nigricans*. Moreau, R. E. 1930. *Halcyon chloris* & *H. smyrnensis*. Laubmann, A. 1924. *Lanius*. Schiebel, G. 1906. *Ploceidae*.

Chapin, J. P. 1917. *Prinia gracilis natronensis*. Moreau, R. E. 1930.

Biometric study of egg for subspecies tendencies. *Cuculus*. Latter, O. H. 1905.

Development of new variety of poultry. Gourgaud,—. 1896.

Effects of civilization. Schuster, W. 1903b.

"Formenkreis" theory. Kleinschmidt, O. 1926a; Stresemann, E. 1936. *Circus aeruginosus*. Stresemann, E. 1924b. Ploceidae. Neunzig, R. 1927a. *Sturnus vulgaris*. Jordans, A. 1923. Book. Text in German. Kleinschmidt, O. 1926b.

Geographic races on margins of habitats. Grinnell, J. & Swarth, H. S. 1913.

Heterogynism. Formicariidae. Hellmayr, C. E. 1929c.

Hybridization role. Menzбир, M. A. 1884; Stresemann, E. 1919c.

Relation of skin pigmentation. Lebedinsky, N. G. 1929.

Role of subspecies in evolution. Bonhote, J. L. 1921b.

EFFECTS OF CLIMATE

General. Figgins, J. D. 1925.

Rainfall. Ogilvie-Grant, W. R. 1915a.

SUPRARENAL (ADRENAL) GLANDS

Book. Text in German. Many species. Gadow, H. F. 1891d.

General. *Columba*. Vincent, S. & Hollenberg, M. S. 1920.

Evolution. Birds incidental. p. 177. Weldon, W. F. 1884b.

Penetration by testis after incomplete castration. *Gallus*. Pézard, A. & Caridroit, F. 1922a.

ANATOMY

General. *Columba* & *Gallus*. Müller, Julius 1929. *Gallus*. *Rabl, H. 1891.

RELATIVE VOLUMES OF CORTEX AND MEDULLA

General. *Gallus*. Latimer, H. B. & Landwer, M. F. 1925.

Proportions of cortex and medulla. Sex differences. *Gallus*. Sauer, F. C. & Latimer, H. B. 1931.

DEVELOPMENT

General. Many species. Hoffmann, C. K. 1892. Includes birds. Fusari, R. 1892. Birds incidental. Janošik, J. 1883.

Anas. *Rex, H. 1897. Includes *Columba*. Brunn, A. 1872. *Gallus*. Gray, H. 1852; Hays, V. J. 1914; Pézard, A. 1922b; *Rabl, H. 1891. Include *Gallus*. Brunn, A. 1872; Soulié, A. H. 1903; Weldon, W. F. 1884a, b, 1885. Includes *Melopsittacus*. Soulié, A. H. 1903. *Passer*. Rau, A. S. & Johnson, P. H. 1923.

Development from mesonephros. *Gallus*. Brandt, A. 1889b.

In grafts on chorio-allantoic membranes. *Gallus*. *Willier, B. H. 1930.

HISTOLOGY

Book. Text in German. Includes birds. Ecker, A. 1846.

General. Includes birds. Ecker, A. 1847. *Columba*. Brunn, A. 1872; Da Costa, A. C. 1913; Müller, Julius 1929. *Gallus*. Brunn, A. 1872; Müller, Julius 1929. *Turtur*. Da Costa, A. C. 1913.

Cortex. Histogenesis. *Melopsittacus*. Soulié, A. H. 1902, 1903.

Medulla. Chromaffin cells. Development. Ciaccio, C. 1906a.

Capsule of suprarenal gland

General. *Anas*, *Cariama*, *Gallus*, *Meleagris*, & *Rhynchotus*. Pettit, A. 1896.

Development. Canalis, P. 1886-87. Includes birds. Goormaghtigh, N. 1913. Include *Gallus*. Valenti, G. 1889a, b. *Melopsittacus*. Soulié, A. H. 1902, 1903.

Histogenesis. Includes birds. Goormaghtigh, N. 1913.

Innervation of capsule. Giacomini, E. 1898.

BLOOD VESSELS

General. Includes birds. Srdínko, O. V. 1905.

Veins. Gratiolet, P. 1853. *Anas*, *Cariama*, *Gallus*, *Meleagris*, & *Rhynchotus*. Pettit, A. 1896.

PHYSIOLOGY

General. Includes *Columba* & *Turtur*. Da Costa, A. C. 1913.

Activity with deficiency of vitamin B. *Columba*. Beznák, A. 1923.

Beginning of function in embryo. *Gallus*. Lutz, B. R. & Case, M. A. 1925.

Effect of ovarian activity. Riddle, O. 1927c.

Glycemia and hyperglycemia involving suprarenal glands. *Columba*. Marañón, G. & Rosique, A. 1916.

Hypertrophy coincident with ovulation. *Columba*. Riddle, O. 1922, 1923f.

Relation of function to activity of brain, sympathetic nervous system, and gonads. *Columba*. Ceni, C. 1921.

SYRINX

In birds, the chief organ of voice is located at or near the bifurcation of the trachea where it is a differentiation of (1) the inferior end of the trachea, (2) the proximal ends of the bronchi, or of (3) both trachea and bronchi.

Books. Text in English. *Cygnus buccinator*. Yarrell, W. 1837-43. *Machaerhamphus*. Andersson, C. J. 1872.

Text in French. Lereboullet, A. 1838.

Text in German. Barkow, H. C. 1871; Haecker, V. 1900. Many species. Gadow, H. F. 1891d. Includes *Anas*, *Mergus*, & *Turdus*. Müller, J. P. 1839b. *Ardea*, *Palamedea*, *Pelecanus*, *Phasianus*, & *Psittacus*. Humboldt, F. H. 1806. *Psittacidae*. Denker, A. 1907.

General. Cynthius, H. 1848; Gadow, H. F. 1891a; Herre, R. 1859; Jones, H. B. 1926; Koditz, W. 1925; Maynard, C. J. 1889e, f; Otto, K. 1872; Rüppell, W. 1933; Sundevall, C. J. 1843. Many species. Bermann, P. 1903; Cuvier, G. L. 1795, 1797, 1800a, 1802; Forbes, W. A. 1881g; Latham, J. 1798; *Yarrell, W. 1833b.

Abdimia. Beddard, F. E. 1886b. *Accipitres*. Beddard, F. E. 1903c. *Anas*. Hérissant, F. D. 1757a. *Anas punctata*. Newton, A. 1871. *Anastomus*. Beddard, F. E. 1901e. *Anati-*

dae. Finn, F. 1900b; Garrod, A. H. 1875c. *Anser gambensis*. Yarrell, W. 1841. *Aptenodytes*. Jäger, G. F. 1832. *Ardea stellaris*. Muralto, J. 1683b. *Ardeidae*. Beddard, F. E. 1886b. *Balaeniceps*. Beddard, F. E. 1888b. *Biziura*. Forbes, W. A. 1882i. *Botaurus lentiginosus*. Maynard, C. J. 1889h. *Bucerotidae*. Beddard, F. E. 1889b. *Caprimulgidae*. Beddard, F. E. 1886d. *Carpophaga*. Garrod, A. H. 1878a. *Carpococcyx*. Beddard, F. E. 1901c. *Casuarii*. Mayer, A. F. 1852; Wedemeyer, G. 1824. *Cathartidae*. Beddard, F. E. 1903a. *Centropus*. Bernstein, H. A. 1860a, b. *Cereopsis novae-hollandiae*. Yarrell, W. 1831a. *Chenopsis atrata*. Peters, W. K. 1858. *Ciconia*. Alix, H. E. 1874d. *Colius*. Pycraft, W. P. 1907e. *Conopophaga*. Forbes, W. A. 1881a. *Coracina*. Burmeister, C. H. 1856a. *Crypturus variegatus*. Beebe, C. W. 1925b. *Cuculidae*. *Beddard, F. E. 1885d, 1902b. *Cygnus*. Mayer, A. F. 1852. *Cygnus buccinator*. Yarrell, W. 1832a. *Dissoura*. Beddard, F. E. 1896b. *Dromaeus* [*Dromiceius*]. Duchamp, G. 1853; Macartney, J. 1836. *Eurylaemidae*. Forbes, W. 1880a. *Gallinae*. *Garrod, A. H. 1879b. *Gallinago g. gallinago*. Pycraft, W. P. 1912a. *Gallus*. Duverney, J. G. 1733a. *Gymnorhina*. Mayr, E. 1931. *Gypagus*. Beddard, F. E. 1903a. *Histrionicus torquatus*. Newton, A. 1859. *Indicator*. Garrod, A. H. 1878c. *Leptosoma discolor*. Forbes, W. A. 1880c. *Limnocryptes gallinula*. Barr, P. H. 1929; Pycraft, W. P. 1912a. *Megacephalon maleo*. Garrod, A. H. 1878e. *Melampitta*. Mayr, E. 1931. *Melanitta*. Miller, W. D. 1916, 1926. *Meleagris*. Perrault, C. 1733f. *Mesites* [*Mesoenas*]. Lowe, P. R. 1924. *Momotidae*. Garrod, A. H. 1878f. *Notornis*. Benham, W. B. 1899a, b. *Oidemia*. Miller, W. D. 1916, 1926. *Opisthocomus*. Beddard, F. E. 1889a; Garrod, A. H. 1879a. *Orthonyx*. Forbes, W. A. 1882d; Mayr, E. 1931. *Palamedea*. Beddard, F. E. & Mitchell, P. C. 1894. *Passeres*. Forbes, W. A. 1880a; Garrod, A. H. 1877d; Müller, J. P. 1845; *Setterwall, C. G. 1901. *Pelecanus*. Mayer, A. F. 1852. *Pelecanus rufescens*. Martin, W. C. 1835b. *Pelionetta*. Miller, W. D. 1916. *Philepitta*. Forbes, W. A. 1880a. *Phoenicopterus*. Weldon, W. F. 1883. *Platalea*. Garrod, A. H. 1875d. *Podica*. Beddard, F. E. 1890c. *Podoo*. Giebel, C. G. 1861b. *Pseudocalyptomena*.

Lowe, P. R. 1931. Psittacidae. Beddard, F. E. & Parsons, F. G. 1893. *Psittacus*. Jacobaeus, O. 1675a; Kutorga, S. 1832; Mayer, A. F. 1852. *Psophia crepitans*. Traill, T. S. 1826. Ratitae [Palaeognathae]. *Forbes, W. A. 1881f. *Rhinochaetes jubatus*. Beddard, F. E. 1891a; Marshall, W. A. 1870. *Rhynchaea*. Beddard, F. E. 1901b. *Rhynchaea capensis*. Wood-Mason, J. 1878. *Sarcorhamphus*. Beddard, F. E. 1890a, 1903a. Scolopacidae. Pycraft, W. P. 1912b. *Scolopax rusticola*. Pycraft, W. P. 1912a. *Seleucides*. Forbes, W. A. 1882h. Spheniscidae. Pycraft, W. P. 1907g. *Steatornis*. Garrod, A. H. 1873c. *Steatornis caripensis*. Müller, J. P. 1842a. *Stictonetta*. Campbell, A. J. 1899. Striges. Beddard, F. E. 1888c. Strigidae. Miller, A. H. 1934. *Struthio*. Mayer, A. F. 1852. *Talegalla*. Owen, R. 1840. *Tantalus*. Garrod, A. H. 1875d, 1878g. Turdidae. Pycraft, W. P. 1905d. *Vanellus*. Garrod, A. H. 1878g. *Xenorhynchus*. Beddard, F. E. 1886b.

Development. Many species. Wunderlich, L. 1886. *Gallus*. Myers, J. A. 1915; Rathke, M. H. 1828b; Tymms, A. O. 1913.

Evolution. Brunelli, G. 1904.

Physiology. Kitchen, J. M. 1885. Many species. *Réthi, L. 1908, 1923. *Gallus*. Myers, J. A. 1915.

Taxonomic significance. *Attagis*. Garrod, A. H. 1877c. Passeres. *Garrod, A. H. 1876g. *Thinocorus*. Garrod, A. H. 1877c.

STRUCTURE

General. Vicq d'Azyr, F. 1782. Many species. Haecker, V. 1898; Réthi, L. 1908, 1923; *Wunderlich, L. 1886. Includes birds. *Hochstetter, F. 1895. *Gallus*. Myers, J. A. 1915; Tymms, A. O. 1913.

Effects of castration. Structure immature. Hosoya, Y. 1915. *Gallus*. Yamaguti, O. 1929.

Innervation. *Conrad, R. 1915. Many species. *Haecker, V. 1898, 1924b; Koditz, W. 1925. *Corvus*, *Galinula*, *Gallus*, & *Sturnus*. Thébault, V. 1895c, 1896c.

Muscles. Herre, L. R. 1859. Passeres. *Müller, J. P. 1845, 1847.

Rhinocetidae. Beddard, F. E. 1889b.

TASTE

Taste buds and nerve endings included.

Books. Text in English. Include birds. Morgan, C. L. 1896a; Owen, R. 1866-68, 2, pp. 129-130; Romanes, G. J. 1884.

General. Bath, W. 1905, 1906; Botezat, E. 1909a; Bumpus, H. C. 1896; Herbst, G. 1851; Schwartz, M. 1908. Many species. *Rensch, B. 1925b. Includes birds. Otto, Hugo 1910b.

Anas. Morgan, C. L. 1894a. *Dacelo*. Pocock, R. I. 1912. *Falcones* & *Gallus*. Waters, G. F. 1883. *Larus argentatus*. Strong, R. M. 1914. *Passer*. Liszt, E. 1917. *Psittacus*. Fabani, C. 1896b. *Struthio*. G., T. H. 1922.

Disagreeable taste of certain seeds and fruits a protection against being eaten by birds. Liebmann, W. 1913.

Function of tongue. Birds incidental. Mayer, A. F. 1844.

Gulls prefer fresh to salt water. Anthony, A. W. 1906.

Palatability of butterflies. *Gracula*. Longstaff, G. B. 1908.

Taste buds and nerve endings. Bath, W. 1905, 1906; *Botezat, E. 1904, 1906a, b, 1909a, 1910a, b, 1911. *Androglossa*. Greschik, J. 1917b.

DISTASTEFULNESS OF INSECTS

Butterflies. Banta, A. M. 1912; Bryant, H. C. 1912b.

Insect larvae. Collinge, W. E. 1919e.

Bad-tasting insects eaten by birds

General. Judd, S. D. 1899b.

Bad-tasting insects eaten by birds if they are sufficiently hungry. Pocock, R. I. 1911a, b.

No insects refused by all birds in aviary. Butler, A. G. 1889a, b.

Unpalatable moths eaten. Standen, R. & Coward, T. A. 1917.

TAXIDERM Y

Books. Text in English. Browne, M. 1896; Chapman, F. M. 1912b; Coues, E. B. 1890; Hornaday, W. T. 1891; Seton, E. T. 1896; Webster, E. B. 1889.

Text in French. Daudin, F. M. 1800.

Text in German. Embalming. Kirchroth, L. 1923.

General. Altum, B. 1855a, b, 1856; Brehm, C. L. 1826; Huber, W. 1930; Pavlov, S. T. 1909a; Réaumur, R. A. 1750b; Ridgway, R. 1891; Shufeldt, R. W. 1893e; Warren, B. H. 1896b; Zielke, J. O. 1908.

Care of bird collection. Wythe, M. W. 1929.

Extraction of fat from bird skins. Lloyd, H. 1918.

Gelatin casts of combs. *Gallus*. Scollick, J. W. 1893.

Teaching-mounts of bird skins with handles. Strong, R. M. 1912d.

TAXONOMY (CLASSIFICATION OF BIRDS)

A very limited number of publications were selected for this section. The reader is referred to the division on bibliographies, pp. 11-17, for the vast literature of bird taxonomy.

Books. Text in English. Beddard, F. E. 1898b; Bonnaterre, P. J. & Vieillot, L. P. 1923; Coues, E. B. 1890; Evans, A. H. 1909; Hudson, W. H. 1895; Knowlton, F. H. 1909; Latham, J. 1781-1802; Nicholson, F. 1889; Seeböhm, H. 1890d. Includes birds. Rolleston, G. 1870.

Text in Finnish. Mäklin, F. W. 1867.

Text in French. Daudin, F. M. 1800; Des Murs, M. A. 1849; Du Petit-Thouars, A. A. 1846-55; Madon, P. 1933; Taczanowski, W. 1884-86.

Text in German. Floericke, C. E. 1908-13; Kaup, J. J. 1835-37, 1844; Merrem, B. 1781; Radde, G. F. 1884. German vernacular names. Reichenow, A. 1913. Key to species. Includes Trochilidae. Hartert, E. J. 1900a.

Text in German and French. Cuvier, G. L. 1817.

Text in Japanese. Kuroda, N. 1913.

Text in Latin. Illiger, J. K. 1811; Klein, J. T. 1759; Sundevall, C. J. 1872-73; Wagler, J. G. 1827; Wilughby, F. 1676.

General. Fürbringer, M. 1892b; Kaup, J. J. 1848a; Lacépède, B. G. 1801; Murphy, R. C. & Chapin, J. P. 1929; Ogilvie-Grant, W. R. 1916; Olphe-Galliard, V. A. 1857; Pucheran, J. 1844; Rothschild, W. 1901; Sclater, P. L. 1896, 1909c; Seeley, H. G. 1866; Stejneger, L. H. 1884c. Many species. Huxley, T. H. 1867, 1868b. Includes birds. Gadow, H. F. 1898.

Palearctic region. Sushkin, P. P. 1925b. Books. Text in English. Dresser, H. E. 1902-03. Text in German. Hartert, E. J. 1903-22.

Islands

Not assigned to continents or Oceanica.

INDIAN OCEAN

Kerguelen Island. Kidder, J. H. 1875; Verrill, G. E. 1895.

NORTH ATLANTIC OCEAN

Azores. Murphy, R. C. & Chapin, J. P. 1929.

SOUTH ATLANTIC OCEAN

Gough Island. Verrill, G. E. 1895.

South Georgia Island. Verrill, G. E. 1895.

Oceans

Antarctica. Book. Text in English. Lowe, P. R. & Kinnear, N. B. 1930.

AFRICA

Books. Text in English. Bannerman, D. A. 1930-36; Shelley, G. E. & Selater, W. L. 1896-1912.

General. Allen, G. M. 1930; Heuglin, M. T. 1860. Many species. Mearns, E. A. 1915.

Belgian Congo. *Chapin, J. P. 1932.

Cape Verde Islands. Murphy, R. C. 1924a.

Central Africa. Gyldenstolpe, N. 1924.

Upper Congo. Reichenow, A. 1923.

East Africa

Book. Text in German. Reichenow, A. 1894.

General. Granvik, H. 1923; Oberholser, H. C. 1905a.

Ethiopia. Hargitt, E. 1883.

Tanganyika. Selater, W. L. & Moreau, R. E. 1932.

EGYPT

Books. Text in English. Meinertzhagen, R. 1930; Shelley, G. E. 1872.

General. Koenig, A. F. 1917, 1920, 1926a, b.

SUDAN

General. Lynes, H. 1924.

Anglo-Egyptian Sudan. Selater, W. L. & Mackworth-Praed, C. W. 1918.

South Africa

Book. Text in English. Stark, A. C. & Selater, W. L. 1900-06.

Madagascar. Geoffroy Saint-Hilaire, I. 1839; Oberholser, H. C. 1900a.

Mashonaland. Marshall, G. A. 1900.

Nyasaland. Book. Text in English. Belcher, C. F. 1930.

West Africa

Book. Text in English. Bates, G. L. 1930.

General. Bannerman, D. A. 1923.

Sierra Leone. Thompson, W. R. 1925.

Southern Nigeria. Bannerman, D. A. 1922a.

Southwest Africa. Book. Text in English. Andersson, C. J. 1872.

Tropical West Africa. Book. Text in English. Bannerman, D. A. 1930-36.

AMERICA

North America

Books. Text in English. *Baird, S. F., Brewer, T. M., & Ridgway, R. 1874; Coues, E. B. 1903; *Ridgway, R. 1901-; Wilson, A., Bonaparte, C. L., Ord, G., & Jardine, W. 1832, 1876.

General. *Cory, C. B. 1918.

Greenland. Book. Text in Danish. Schiøler, E. L. 1925-31.

Eastern North America. Book. Text in English. Chapman, F. M. 1912b.

North America and adjacent islands. *Hellmayr, C. E. 1925-35.

Northwest North America. Book. Text in English. Coues, E. B. 1877.

Western North America. Coasts. Townsend, C. H. 1890.

ALASKA

General. Laing, H. M., Taverner, P. A., & Anderson, R. M. 1927.

Bering Sea and Pribilof Islands. Hanna, G. D. 1920.

CANADA

Book. Text in English. Macoun, J. & Macoun, J. M. 1909.

General. Taverner, P. A. 1934.

Labrador. Norton, A. H. 1901.

Newfoundland. Noble, G. K. 1919.

Western Canada

General. Taverner, P. A. 1926.

British Columbia

General. Includes birds. Swarth, H. S. 1924.

Queen Charlotte Islands. Includes birds. Osgood, W. H. 1901.

Vancouver Island. Includes birds. Swarth, H. S. 1912c.

UNITED STATES

Western United States. Bailey, F. A. 1904.

Arizona. Oberholser, H. C. 1930.

California. San Clemente, San Miguel, and Santa Barbara Islands. Howell, A. B. 1917.

Illinois. Cory, C. B. 1909a.

Massachusetts. Book. Text in English. Forbush, E. H. 1925-27.

Minnesota. Book. Text in English. Roberts, T. S. 1932.

New Jersey. Stone, W. 1909.

New Mexico. Oberholser, H. C. 1930.

Oklahoma. Nice, M. M. 1931a.

Pennsylvania. Book. Text in English. Burns, F. L. 1919; Warren, B. H. 1890.

Wisconsin. Cory, C. B. 1909a.

WEST INDIES

Antigua and Barbuda Islands. Riley, J. H. 1904.

Cuba and Isle of Pines. Todd, W. E. 1916.

Dominican Republic and Haiti. Wetmore, A. & Swales, B. H. 1931.

Guadeloupe Island. Noble, G. K. 1916.

Leeward Islands. Cory, C. B. 1909b.

Trinidad Island. Chapman, F. M. 1892; Hellmayr, C. E. 1906. Book. Text in French. Léotaud, A. 1866.

Middle America

Book. Text in English. Ridgway, R. 1901-.

General. *Cory, C. B. 1918; van Rossem, A. J. 1934.

Cocos and Malpelo Islands. Townsend, C. H. 1895.

Costa Rica. Bangs, O. 1908b, 1909; Cherrie, G. K. 1891.

Guatemala. Dearborn, N. 1907; Nelson, E. W. 1897.

Honduras. Bangs, O. 1903; Peters, J. L. 1929b.

MEXICO

General. Nelson, E. W. 1897.

Coronados Island. Howell, A. B. 1917.

Guadaloupe Island. Ridgway, R. 1876.

Lower California. Brewster, W. 1902.

Sonora. van Rossem, A. J. 1931.

Yucatan. Cabot, S. 1844a.

PANAMA

General. Griscom, L. 1935b.

Bay of Panama. Canal Zone. Stone, W. 1918.

Pearl Islands. Thayer, J. E. & Bangs, O. 1905.

South America

General. Brabourne, W. W. & Chubb, C. 1913; *Cory, C. B. 1918.

Argentina. Friedmann, H. 1927b.

British Guiana. Book. Text in English. Chubb, C. 1916.

Colombia. Bangs, O. & Barbour, T. 1922.

Curacao Island. Berlepsch, H. H. & Peters, E. 1892.

Ecuador. Salvadori, A. T. & Festa, E. 1899.

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Patagonia. Stone, W. 1928; Wetmore, A. 1926g.

Peru. Hellmayr, C. E. 1920; Zimmer, J. T. 1930.

South America and adjacent islands. *Hellmayr, C. E. 1925-35.

BRAZIL

General. *Hellmayr, C. E. 1912, 1929b; Ihering, H. 1914b. Includes birds. Burmeister, C. H. 1856b.

Amazon River mouth. Hellmayr, C. E. 1912.

Matto Grosso. Naumburg, E. M. 1930.

VENEZUELA

General. Hellmayr, C. E. & Seilern, J. 1912.

Margarita Island. Robinson, W. & Richmond, C. W. 1896.

Orinoco River region. Berlepsch, H. H. & Hartert, E. 1902; Cherrie, G. K. 1916.

Silla de Caracas. Hellmayr, C. E. 1924.

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OF SOUTH AMERICA

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Galapagos Archipelago. *Ridgway, R. 1889, 1897; Snodgrass, R. E. & Heller, E. 1904; Swarth, H. S. 1931.

ASIA

General. Bangs, O. 1921; Kinnear, N. B. 1922. Central Asia. Hellmayr, C. E. 1929a; Oberholser, H. C. 1900b.

Arabia. Bates, G. L. & Philby, H. S. 1936.

Malay Archipelago. Wallace, A. R. 1865.

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Turkestan. Book. Text in French. Menzbir, M. A. 1888-94.

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Central China, Inner Mongolia, Kansu, and Chihli. Riley, J. H. 1930a.

Eastern China. Book. Text in English. La Touche, J. D. 1925-34.

Jehol. Book. Text in English. Taka-Tsukasa, N., Hachisuka, M., Kuroda, N., Yamashina, Y., & Uchida, S. 1933.

Yunnan. Rothschild, L. W. 1926b. West-central and northwestern Yunnan. Rothschild, L. W. 1921.

India

Books. Text in English. Murray, J. A. 1888-90. Game birds. Baker, E. C. 1921-30.

General. Baker, E. C. 1922b.

Burma. Books. Text in English. Oates, E. W. 1883. Game birds. Baker, E. C. 1921-30.

Ceylon. Books. Text in English. Murray, J. A. 1890. Game birds. Baker, E. C. 1921-30.

Japan

Books. Text in English. Hachisuka, M. 1925; Kuroda, N. and others 1922; Seeböhm, H. 1890c.

Malay Peninsula

General. Riley, J. H. 1938.

Malay Peninsula and neighboring islands. Book. Text in English. Robinson, H. C. 1927-28.

Siam

General. Kloss, C. B. 1918; Riley, J. H. 1938; Gyldenstolpe, N. C. 1916.

Siberia

Books. Text in French and Slavic. Bogdanow, M. N. 1884.

Text in German and Slavic. Pleske, T. D. 1889-92.

EUROPE

Books. Text in English. Dresser, H. E. 1871-96.

Text in French. Degland, C. D. 1849; Dubois, A. J. 1899-1901; Des Murs, M. A. 1886. Predaceous birds. Madon, P. 1933.

Text in German. Arnold, F. 1897; Gloger, C. W. 1834; Heinroth, O. & Heinroth, M. 1924-28; Naumann, J. F. 1905.

Belgium. Havre, G. C. 1928.

British Isles. Books. Text in English. Witherby, H. F. and others 1920-24; Wyatt, C. W. 1894-99.

Denmark. Book. Text in Danish. Schjölter, E. T. 1925-31.

Finland. Book. Text in Finnish. Hortling, I. J. 1929-.

Germany. Hellmayr, C. E. & Laubmann, A. 1916. Book. Text in German. Brehm, C. L. 1831b.

Holland. Books. Text in Dutch. Schlegel, H. 1859; van Oort, E. D. 1922-35.

Hungary. Book. Text in Hungarian. Gyula, M. (Madarász, G.) 1903.

Iceland. Books. Text in Danish. Schjölter, E. T. 1925-31. Text in German. Hantzsch, B. 1905.

Italy. Books. Text in Italian. Arrigoni degli Oddi, E. 1904, 1929; Giglioli, E. H. 1907; Martorelli, G. 1895a.

Lithuania. Sachtleben, H. 1922a.

Russia. Books. Text in French and Slavic. Bogdanow, M. N. 1884. Text in German and Slavic. Pleske, T. D. 1889-92.

Scandinavia. Book. Text in Swedish. Kolthoff, G. I. & Jägerskiöld, L. 1898.

Sweden. Sundevall, C. J. 1856-87.

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Australia

Books. Text in English. Gould, J. 1865; Mathews, G. M. 1910-28; Wolstenholme, H. 1926.

General. White, S. A. 1914.

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Borneo. Riley, J. H. 1930b.

Celebes Island. Blasius, W. 1885a; Riley, J. H. 1918.

Molucca Islands. Book. Text in Italian. Salvadori, A. T. 1880-82.

Natuna Islands. Oberholser, H. C. 1932.

New Guinea (Papua). Hartert, E. J. 1930; Mathews, G. M. 1916; Stresemann, E. 1923c. Book. Text in English. Gould, J. & Sharpe, R. B. 1875-88. Text in Italian. Salvadori, A. T. 1880-82.

Tambelan Islands. Oberholser, H. C. 1919b.

Sumatra

General. Oberholser, H. C. 1912; Stone, W. 1902; Stresemann, E. 1921b.

Barussan Islands. Oberholser, H. C. 1912.

New Caledonia. Verreaux, J. P. & Des Murs, M. A. 1862.

New Hebrides. Murphy, R. C. and others 1924-39.

Pulo Taya Island. Oberholser, H. C. 1919c.

Simalu Island. Oberholser, H. C. 1919d.

Solomon Islands. Murphy, R. C. and others 1924-39.

Melanesia**BISMARCK ARCHIPELAGO**

Feni and Nissan Islands. Hartert, E. J. 1926b.

French Islands. Hartert, E. J. 1926c.

New Pomerania (New Britain) Island. Hartert, E. J. 1926a.

New Zealand

Book. Text in English. Oliver, W. R. 1930.

Philippine Islands

Books. Text in English. Hachisuka, M. 1931-; McGregor, R. C. & Worcester, D. C. 1906.

General. Bourns, F. S. & Worcester, D. C. 1894; McGregor, R. C. 1903, 1920; Mearns, E. A. 1909.

Santa Cruz Island. Murphy, R. C. and others 1924-39.

Polynesia

Fiji Islands. Layard, E. L. 1876a, b.

Samoan Islands. Murphy, R. C. and others 1924-39; Whitmee, S. J. 1875a.

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Books. Text in English. Accipitres. Swann, H. K. 1922. Alcedinidae. Sharpe, R. B. 1868-71. Anatidae. Cory, C. B. 1897; Eyton, T. C. 1838. Bucconidae. Selater, P. L. 1879-82. Bucerotidae. Elliot, D. G. 1877-82. Capitonidae. Marshall, C. H. & Marshall, G. F. 1870-71. Cathartes. Beddard, F. E. 1903a. Charadriiformes. Elliot, D. G. 1895; Low, G. C. 1924. Columbiformes of India. Baker, E. C. 1913b. Coraciidae. Dresser, H. E. 1893. *Didus*. Strickland, H. E. & Melville, A. G. 1848. Falconiformes. Swann, H. K. 1924-. Fringillidae. Bartlett, E. 1888-89. Galbulidae. Selater, P. L. 1879-82. Galliformes. Elliot, D. G. 1897. Gruidae. Blaauw, F. E. 1897. *Gypagus*. Beddard, F. E. 1903a. Hirundinidae. Sharpe, R. B. & Wyatt, C. W. 1885-94. Lariinae. Mivart, St. J. 1896a. Meropidae. Dresser, H. E. 1884-86. Nectariniidae. Shelley, G. E. 1876-80. Paradiseidae. Elliot, D. G. 1873; Sharpe, R. B. 1891-98. Phasianidae. Elliot, D. G. 1870-72. Japan, Formosa, Korea. Kuroda, N. 1926c. Pittidae. Elliot, D. G. 1893-95. Ploceidae. Bartlett, E. 1888-89. Procellariiformes. Godman, F. D. 1907-10. Psittaci. Species kept in confinement. Seth-Smith, D. 1902-03. Psittacidae. Lear, E. 1830-32. Pteroclididae. Elliot, D. G. 1878b. Ptilonorhynchidae. Sharpe, R. B. 1891-98. *Ptilopus*. Elliot, D. G. 1878a. Rhamphastidae. Gould, J. 1833-35, 1855. *Sarcorhampus*. Beddard, F. E. 1903a. Sylviidae. Chapman, F. M. 1907b. Trochilidae. Elliot, D. G. 1878-79; Gould, J. 1861a, b; Gould, J. & Sharpe, R. B. 1880-87. Trogonidae. Gould, J. 1858-75. Turdidae. Seeböhm, H. & Sharpe, R. B. 1898-1902.

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Text in German. Birds of prey. Europe. Engelmann, F. 1928. Falconiformes. Europe. Schlegel, H. 1845. Musophagidae. Schlegel, H. & Westermann, G. F. 1860. Paradiseidae. Rothschild, L. W. 1898. Picidae. Marshall, W. A. 1889. Psittacidae. Finsch, O. 1867-68. Sylviinae. Pleske, T. D. 1889-92. Trochilidae. Hartert, E. 1900a.

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Acanthidositta. Pycraft, W. P. 1905f. *Aegithalos*. Stresemann, E. 1919b. Alcae. Shufeldt, R. W. 1901b. Alcedinidae. Miller, W. D. 1912. Alcidae. Brandt, J. F. 1837c. Anatidae. Murphy, R. C. 1916. *Aphriza virgata*. Shufeldt, R. W. 1888e. Aramidae. Shufeldt, R. W. 1916c. *Aramus vociferus*. Shufeldt, R. W. 1915f. *Balaeniceps*. Böhm, M. 1930; Giebel, C. G. 1873. *Biziura*. Pycraft, W. P. 1906b. *Chamaea*. Shufeldt, R. W. 1889e. *Chordeiles*. Oberholser, H. C. 1914. *Coereba*. Lowe, P. R. 1912. *Colius*. Murie, J. 1872d. Columbidae. Bonaparte, C. L. 1854. *Corvus*. Hartert, E. J. 1901. Cracidae. Goeldi, E. A. 1903. Cuculidae. Beddard, F. E. 1885d; Ihering, H. 1914a. Cygninae. Stejneger, L. H. 1882. Cypselidae. Slater, P. L. 1865b. *Dendrocygna*. Shufeldt, R. W. 1915d. Drepanidae. Scharnke, H. 1932. *Egretta*. Bailey, A. M. 1928c. *Eurylaemus*. Slater, P. L. 1872. Falcones. Pelzeln, A. 1862. Falconiformes. Brandt, J. F. 1853; Sushkin, P. P. 1899a, 1900b. Galli. Blanchard, C. E. 1857a. *Geothlypis*. Palmer, W. 1900. Gruiformes. Shufeldt, R. W. 1915b. Halcyones. Shufeldt, R. W. 1903a. *Heliodilus*. Milne-Edwards, A. 1878b. Herodii. Swenander, G. 1903. *Hesperiphona*. Sushkin, P. P. 1925a. *Hypochera ignestii*. Moltoni, E. 1925. *Indicator*. Slater,

P. L. 1870. Insectores. Blyth, E. 1838b. *Irrisor*. Strickland, H. E. 1843. *Iynx*. Fürbringer, M. 1889. Lagopodes. Stejneger, L. H. 1884a. *Lanius*. Miller, A. H. 1931. *Leptosoma discolor*. Slater, P. L. 1865c. *Melanitta*. Miller, W. D. 1916. *Meleagris ocellata*. Cabot, S. 1844b. *Mesites*. Lowe, P. R. 1924; Milne-Edwards, A. 1878a, c. *Micrastur*. Slater, W. L. 1918. Momotidae. Garrod, A. H. 1878f. *Momotus*. Murie, J. 1872e. Nectariniidae. Scharnke, H. 1932. *Notornis*. Owen, R. 1882. *Oidemia*. Miller, W. D. 1916. *Palamedea*. Shufeldt, R. W. 1901c. *Palamedea chavaria*. Parker, W. K. 1863. *Palamedeidae*. Garrod, A. H. 1876e. Paridae of Hungary. Madarász, G. 1881. Passeres. Blyth, E. 1838b; Scharnke, H. 1932. *Pedioecetes*. Snyder, L. L. 1935a, b. Pelargi. Swenander, G. 1903. Pelecanoididae. Murphy, R. C. & Harper, F. 1921. *Pelionetta*. Miller, W. D. 1916. *Peltops*. Slater, P. L. 1872. Phasianidae. Ghigi, A. 1903b. Phasianidea of North America. Stejneger, L. H. 1899b. *Photodilus badius*. Beddard, F. E. 1890d; Geoffroy St. Hilaire, E. 1830; Milne-Edwards, A. 1878b. Pici. Blyth, E. 1838b. *Piranga flava*. Zimmer, J. T. 1929a. Pittidae. Gould, J. 1880-81? *Plautus impennis*. Preyer, W. T. 1862. Ploceidae. *Chapin, J. P. 1917; Sushkin, P. P. 1927. Procellariidae. Coues, E. B. 1866; Forbes, W. A. 1882n; Hombroon, J. B. & Jacquinet, C. H. 1844. Northeastern Pacific Ocean. Mathews, G. M. 1915. Promeropidae. Scharnke, H. 1932. *Pseudocalyptomena*. Lowe, P. R. 1931. *Pseudogerygone*. McLean, J. C. 1907. Psittaci. Milne-Edwards, A. 1866. Wagler, J. G. 1832. Psittaci of Malayan region. Wallace, A. R. 1864a. Psittacidae. Blanchard, C. E. 1856. *Psophia*. Beddard, F. E. 1890e. Pteroclididae. Olphe-Galliard, V. A. 1855; Shufeldt, R. W. 1901e. Pygopodes. Shufeldt, R. W. 1892a, 1904b. *Pyrhula*. Stresemann, E. 1919b. Rallidae. Stone, W. 1894b. Ralliformes. Shufeldt, R. W. 1915b. Raptores. Swenander, G. 1903; Sushkin, P. P. 1900b. *Seatonis*. Humboldt, F. H. 1817, 1841. Steganopodes. Brandt, J. F. 1837a, 1838a; Swenander, G. 1903. Strigidae. Beddard, F. E. 1890d; Geoffroy St. Hilaire, E. 1830; Kaup, J. J. 1848b, 1862. *Sylvia atricapilla*. Murr, F. 1926. *Sylvia caligata*. Strese-

mann, E. 1928b. *Thalassidroma*.
 Forbes, W. A. 1881h. Thraupidae.
 Selater, P. L. 1856; Zimmer, J. T.
 1929a. *Thryomanes b. bewicki*. Swarth,
 H. S. 1916. *Todus*. Selater, P. L.
 1872. Trochilidae. Elliot, D. G.
 1878-79. *Troglodytes albinucha*. Cabot,
 S. 1848. Tubinares [Procellariiformes].
 Forbes, W. A. 1882n. Loomis, L. M.
 1918. Turdidae. Pycraft, W. P.
 1905d. *Upupa*. Strickland, H. E.
 1843. Upupidae. Murie, J. 1873b.
Xenicus. Pycraft, W. P. 1905f.
Zeledonia coronata. Pycraft, W. P.
 1905d.

Duck or goose? *Cairina moschata*.
 Osgood, W. H. 1914.

Genetic relations. Herodii, Pelargi,
 Raptores, & Steganopodes. Swenander,
 G. 1903.

Heterogynism: Males similar in
 certain allied forms, but females
 different. Formicariidae. Hellmayr,
 C. E. 1929c.

History of 50 years of taxonomy in
 America. Peters, J. L. 1933.

Species types in Royal Natural
 Museum of Stockholm. Gyldenstolpe,
 N. C. 1927.

CHECK LISTS, HAND LISTS, AND INDEX LISTS

Books. Text in English. Baker, T.
 B. 1835; Gray, G. R. 1844-49, 1869-
 71; Ogilvie-Grant, W. R. 1912b;
 *Peters, J. L. 1931-37; *Sharpe, R. B.
 1899-1909; *Sharpe, R. B. and others
 1874-98; Waterhouse, C. O. 1902;
 Waterhouse, F. H. 1890; Wytzman, P.
 A. 1905-14. Includes birds. Sherborn,
 C. D. 1902-33. Accipitres. Swann,
 H. K. 1922.

Text in German. Giebel, C. G. 1872-
 77. Birds incidental. Schulze, F. E.
 and others 1926-.

Text in Latin. Latham, J. 1790.

Generic names

Generic names applied to birds, 1916-
 22, with additions to Waterhouse's
 Index Generum Avium. Richmond,
 C. W. 1927.

Various regions

Africa. Ethiopian region. Book.
 Text in English. Selater, W. L. 1924-
 30.

Australia. Book. Text in English.
 Mathews, G. M. 1927.

Bavaria. Hellmayr, C. E. & Laub-
 mann, A. 1916.

Burma. Book. Text in English.
 Oates, E. W. 1883.

India. Baker, E. C. 1922b.

North America. American Orni-
 thologist's Union 1931.

CHARACTERS EMPLOYED IN TAXONOMY

See also under **Anatomy**, **Coloration**,
 and **Plumage**, also in all sections deal-
 ing with anatomic topics.

General. Geoffroy Saint-Hilaire, I.
 1832a.

Color of feet. *Larus*. Kobbé, W. H.
 1902.

Generic characters. Trochilidae.
 Taylor, W. P. 1909.

Homotypis and allied characters in
 eggs. *Sterna hirundo*. Rowan, W.,
 Parker, K. M., & Bell, J. 1914.

Superficial characters. Vigors, N.
 A. 1825. Nestling birds in Europe.
 Vian, J. 1886.

Tongue characters. Gardner, L. L.
 1925, 1927a; Lucas, F. A. 1896f.
 Young birds. Ingram, C. 1907b.
Cathartes. Beddard, F. E. 1903a.

White color variation in remiges of
Larus not a good taxonomic character.
 Gloger, C. W. 1854c.

Anatomic characters

General. *Fürbringer, M. 1888; Her-
 man, O. 1902a; Merrem, B. 1816;
 *Pycraft, W. P. 1900b; Wallace, A. R.
 1856. Many species. Reichenow, A.
 1877b.

Aquila. Segond, L. A. 1864a.
Aramus. L'Herminier, F. J. 1849.
Attagis. Garrod, A. H. 1877c. *Biziura*.
 Forbes, W. A. 1882i. Caprimulgidae.
 Selater, P. L. 1866a, b. *Conopophaga*.
 Forbes, W. A. 1881a. *Crotophaga*.
 L'Herminier, F. J. 1849. *Cygnus* &
Gallus. Segond, L. A. 1864a. Eurylae-
 midae. Forbes, W. A. 1880a. *Helias*.
 L'Herminier, F. J. 1849. *Palamedea*
chavaria. Parker, W. K. 1863. *Pedio-*
nomus torquatus. Gadow, H. F. 1891b.
Phoenicopterus. Weldon, W. F. 1883.
 Psittacidae. Garrod, A. H. 1874e.

Pterocles. Gadow, H. F. 1882c. *Rupicola* & *Steatornis*. L'Herminier, F. J. 1849. *Struthio*. Segond, L. A. 1864a. *Thinocorus*. Garrod, A. H. 1877c. *Todidae*. Forbes, W. A. 1882l.

Embryologic characters. Includes birds. Dassonville, C. 1894.

Intestinal coils. Gadow, H. F. 1889b; Mitchell, P. C. 1896b.

Lungs. Campana, A. 1870.

Syrinx and trachea as characters. Latham, J. 1798. *Cathartes*. Beddard, F. E. 1903a.

MUSCLES AND TENDONS AS CHARACTERS

General. Mitchell, P. C. 1913b. Many species. Shufeldt, R. W. 1887j. *Macropterygidae*. Lucas, F. A. 1894a.

Esophageal muscles. *Toccos*. Gulliver, G. 1872.

M. ambiens. Absence or presence. Garrod, A. H. 1877b.

Muscular sheath of esophagus. Deficiency in striped muscle. *Raptores*. Gulliver, G. 1870.

Thigh muscles. Garrod, A. H. 1873b, 1874b.

SKELETAL CHARACTERS

See also under **Skeleton**.

General. Blanchard, C. E. 1859; Newton, A. 1868; Pycraft, W. P. 1902b; Wallace, A. R. 1864b.

Accipitres. Sushkin, P. P. 1899a, 1905. *Cariama*. Gervais, F. L. 1855. *Chaetura*. Lucas, F. A. 1886. *Chionis minor*. Reichenow, A. 1876. *Eurylaimidae*. Pycraft, W. P. 1905a. *Falconiformes*. Sushkin, P. P. 1900c. *Grandidactylus*. Pycraft, W. P. 1927. *Gruiformes*. Shufeldt, R. W. 1895. *Hemipodius*. Parker, W. K. 1862a. *Merula*. Pycraft, W. P. 1927. *Mesites* [*Mesoenias*] & *Monias*. Lowe, P. R. 1924. *Opisthocomus* & *Palamedea*. Gervais, F. L. 1855. *Parus caudatus*, *P. coerulescens*, & *P. major*. Giebel, C. G. 1854c. *Psittacidae*. Bonaparte, C. L. 1857. *Pterocles*, *Syrhaptes*, & *Tinamus*. Parker, W. K. 1862a. *Totanus*. Nichols, J. T. 1923b.

Diagnosis of suborders. Many species. Seebohm, H. 1888, 1889, 1890a, b.

Numbers of vertebrae in different orders. MacLeay, W. S. 1829.

Species and subspecies characters. Kattinger, E. 1929.

SKULL CHARACTERS

General. *Charadriiformes*. Lowe, P. R. 1915b, c, 1916b.

Nasal bones of skull. Garrod, A. H. 1873d.

Palatine and vomer bones. Heerwagen, A. 1889.

Oological characters

Egg structure. König-Warthaussen, R. 1876. Many species. *Nathusius*, W. 1871a.

Shell structure. *Nathusius*, W. 1878; *Szielasko*, A. E. 1913.

Weight of egg. Kutter, O. F. 1881.

Plumage characters

Aftershaft. Miller, W. D. 1924b.

Arrangement of cubital coverts in *Euornithae*. Goodchild, J. G. 1891a, 1894.

Down plumage. *Laro-Limicolae*. Knopfli, W. 1913.

Errors due to abrasion and bleaching of plumage. Dwight, J. 1905.

Feather and scute patterns on feet. Many species. Reichenow, A. 1871.

Feathering of wing. Miller, W. D. 1915.

Number of primaries. Coues, E. B. 1876b.

Pterylosis. *Passeres*. Nitzsch, C. L. & Giebel, C. G. 1862b; Wallace, A. R. 1874.

GENOTYPES

General. Laubmann, A. 1920.

Genotype determination. Allen, J. A. 1912.

METHODS IN TAXONOMY

Affinity of species. Saint-Loup, R. 1901a.

Experimental demonstration of species specificity as shown by grafting kidney of *Anas* on chorio-allantoic

membrane of *Gallus*. Sandstrom, C. J. 1929.

Precipitin reactions method. Erhardt, A. 1930.

Quantitative methods. *Lanius*. Strong, R. M. 1901.

PHYLOGENETIC RELATIONSHIP

General. Columbiformes. Martin, R. 1904.

Relationships of ratite birds to dinosaurs and to *Archaeopteryx*. Lowe, P. R. 1935.

RELATIONS OF SUBSPECIES TO SPECIES

Development of conceptions of species, variety, and subspecies. Stresemann, E. 1927a.

Importance of seasonal changes. Blyth, E. 1836.

Limits of species and subspecies. Rensch, B. 1928.

Species and subspecies values. Dwight, J. 1918.

SUBSPECIES

General. *Anas obscura rubripes*. Townsend, C. W. 1912c. *Cuculus canorus*. Rennie, J. 1914. Ploceidae. Neunzig, R. 1927b.

Age of some races of birds. *Columba livia dakhloe*, *Galerida cristata brachyura*, *Galerida cristata nigricans*, & *Prinia gracilis natronensis*. Moreau, R. E. 1930.

Criteria for determination of subspecies. Chapman, F. M. 1924.

Mutation forms. Stresemann, E. 1923f.

Origin of races. Silky and woolly fowl. *Gallus*. Taubert, F. 1910.

Origin of subspecies. Meinertzhagen, R. 1921d.

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General. Stresemann, E. 1936.

Fringilla. Gengler, J. 1917. *Halcyon chloris* & *H. smyrnensis*. Laubmann, A. 1924. *Lanius cristatus*. Stresemann, E. 1927b. *Motacilla alba*. Sachtleben,

H. 1922b. *Sturnus vulgaris*. Jordans, A. 1923.

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Books. Text in Latin. Linnaeus, C. 1746, 1766-68; Sundevall, C. J. 1872-73.

General. Boulton, W. R. 1932; Gadow, H. F. 1892; Shufeldt, R. W. 1904a; Stejneger, L. H. 1884c; Sundevall, C. J. 1842; Vigors, N. A. 1823, 1825; Wetmore, A. 1933d.

Synopsis of families. Includes birds. Cope, E. D. 1889.

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General. French names. Passeriformes. Raspail, X. 1896b.

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Madagascar. Hova and provincial Malagasy. Sibree, J. 1891.

Poland. Book. Text in Polish. Małkowski, W. 1902.

United States

General. McAtee, W. L. 1911d, 1914e, 1923b.

Paiute Indian names. Anon. 1936.

TECHNIC

See also under **Apparatus, Methods, Poultry culture, and Tissue culture.**

Books. Text in German. Abderhalden, E. 1920-.

Text in English. Includes methods. Chapman, F. M. 1912b.

Bacteriological examination of shell eggs. Rush, J. E. 1915.

Bird houses. Construction. Forbush, E. H. 1915; Jacobs, J. W. 1909.

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Clearing albumen of egg. Tarkhanov, I. R. 1886. Coagulated egg albumen. *Gallus*. Zoth, O. 1892.

Coloring egg yolks. Morgan, W. A. & Woodroof, J. G. 1927.

Corrosion preparations of birds' lungs. Includes birds. Zumstein, J. J. 1892.

Cross sections. Preparation. *Gallus*. Bittner, H. 1925a.

Culture technic of the sporozoites of *Plasmodium*. Sergent, Etienne & Sergent, Edmond 1910.

Destruction of labyrinth. Nishihata, T. 1927b.

Dissection. *Columba* & *Gallus*. Bittner, H. 1924.

Feathers, removal by dry method. Paralysis of feather muscles. King, C. H. 1921.

Field work. Sokolowski, J. 1937. Books. Text in English. Coues, E. B. 1890, 1903.

Gastric juice obtained from stomach. *Gallus*. Collip, J. B. 1922.

Hydrocyanic acid gas. Detection in small quantities by use of birds. *Columba* & *Passer*. Grubbs, S. B. 1917.

Intestinal parasites. Removal from poultry. Ireland, J. W. & Lamb, A. R. 1926.

Iodine as vermicide on poultry farm. Chandler, W. L. 1926.

Long-continued observation of heart contractions. *Columba*. Wagner, R. 1860.

Mirror and small electric light used to view nests in cavities of trees. Cathelin, F. 1923.

Ophthalmoscopic demonstration of pecten. Fieuzal, J. M. 1875.

Oxidation of fat by hydrogen peroxide. *Gallus*. Hepburn, J. S. 1912.

Pineal body. Experimental technic. Book. Text in German. Kolmer, W. A. 1924b.

Poisoning methods. Fisher, A. K. 1888a. *Corvus*. Csörgey, T. 1924. *Passer*. Fisher, A. K. 1889b.

Recognition of fertility. *Gallus*. Dareste, C. 1862f.

Removing embryos from eggs intended for oological collections. Renshaw, G. 1900.

Sex identification. *Columba*. Iwata, I. 1924, 1926. *Gallus*. Dunn, L. C. 1923d. Book. Text in English. Cage birds. Butler, A. G. 1907c.

Skeleton. Preparation. Eyton, T. C. 1859; Newton, A. 1860b.

Tissue culture. Includes *Gallus*. Rous, F. P. & Jones, F. S. 1916. Book. Text in English. Strangeways, T. S. 1924.

Ultraviolet light. Used for preventing rachitis. *Gallus*. Mussehl, F. E. & Ackerson, C. W. 1930a.

X-rays. Use in study of respiratory apparatus. Dubois, R. 1899.

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Barometer. Use in study of blood circulation and respiration. Includes *Columba*. Barry, M. 1827.

Centrifuging blood. Delezenne, C. 1896a.

Extraction of blood from heart. *Columba* & *Gallus*. Nicolle, C. & Lebaillly, C. 1919. *Gallus*. Sloan, H. J. & Wilgus, H. S. 1930.

Hemolysins and hemagglutinins preparations. *Gallus*. Hyde, R. R. & Bailey, C. E. 1922.

Manoilov reaction test. Riddle, O. 1927b.

Measurement of blood pH. Includes *Anas* & *Gallus*. Drouin, R. 1890.

Vital stain for blood. Mori, K. 1929.

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General. Rabaud, E. 1908b; Tur, J. 1902d.

Demonstration of blood vessel in embryos. *Gallus*. Rost, F. 1910-11.

Development of embryo after removal from shell. *Gallus*. Paton, S. 1911.

Electrolysis of regions in blastoderm. *Gallus*. Kopsch, F. 1927.

Embryo model. Preparation. Bujard, E. 1924.

Embryonic membranes, demonstrations of. *Gallus*. Stuart, T. P. 1891.

Experimental embryology. Mitrophanov, P. I. 1899b.

Fixation of embryo in alcohol. Early record. Boyle, R. 1666.

Microscope. Use in embryology. Croone, W. 1757.

Mounting embryos. *Gallus*. Mavor, J. W. 1928.

Museum methods. Specimens illustrating embryonic stages. *Gallus*. Gage, S. P. 1898.

Opening of incubated eggs. *Gallus*. Bau, K. 1922.

Sectioning. Duval, M. M. 1885c.

Artificial incubation

See also under **Poultry culture**.

General. Cave, C. J. & Jones, T. V. 1925.

Multiple turning of eggs. Effect on embryos. *Gallus*. Clarke, T. B. 1933; Dareste, C. 1885c.

Blastoderm preparation

General. *Gallus*. Drasch, O. 1914; Haswell, W. A. 1889.

Prevention of curling of blastoderm in fixation. Miller, N. 1911.

Removal of blastoderm. Andrews, E. A. 1904.

Observation of living embryo

General. *Gallus*. Byerly, T. C. 1926a; McWhorter, J. E. & Whipple,

A. O. 1912; Vogelaar, J. P. & Boogert, J. B. 1925.

Demonstration in small glass. Romanoff, A. L. 1933a.

Orientation of embryo

Determination. Gerlach, L. 1882b.

Localization of median plane of embryo. Includes *Gallus*. Morgan, T. H. 1924.

INJECTION

Air sac injections. Bignon, F. 1890b; Plateau, F. 1880; Schröder van der Kolk, J. L. 1859-60; Schulze, F. E. 1912.

Lungs and air sacs. Roché, G. 1889a.

Trypan blue into developing embryo. Wislocki, G. B. 1921.

Blood vessel injections

General. Miller, W. S. 1893.

Small embryos under microscope. Earle, W. R. 1924; Knower, H. M. 1908.

LYMPHATIC VESSELS

Demonstration. Breschet, G.-1824.

Ligature of mesenteric vessels in finding lymphatic vessels. *Anser*. Hewson, W. 1768.

Preparation of lymphatic vessels. *Lauth, E. A. 1822.

MICROSCOPIC TECHNIC

Dark field illumination in study of blood. Dietrich, A. 1908.

Polarized light. Used in studying structure of egg shell. *Anser* & *Struthio*. Schmidt, W. J. 1922.

Preparation of embryos for sectioning. *Gallus*. Gage, S. H. & Hopkins, G. S. 1890.

Ultramicroscopic. Slonimski, P. 1927b. Includes *Gallus*. Stuebel, H. 1914.

Fixing methods

Chromosomes. Hance, R. T. 1925b.

Lens. Includes birds. Pflugk, A. 1909.

Sjövall's method in the study of oogenesis. *Passer*. Van Durme, M. 1907.

Staining methods

Golgi apparatus in intestinal epithelium. Weigl, R. 1911.

Hemoglobin stains. Wissozky, N. 1877.

Weigert's method. Use in study of spermatogenesis. *Passer*. Loisel, G. 1903c.

BLOOD PARASITES

General. Laveran, C. L. 1892, 1899b.

Detection of coccidia. Hadley, P. B. 1909b.

VITAL STAINING

General. Includes *Gallus*. Mori, Shigeki 1925.

Embryonic membranes stained with trypan blue. *Gallus*. Hanan, E. B. 1926, 1927.

Embryos. *Gallus*. Gräper, L. 1911, 1929a; Wetzel, R. 1925.

Mitochondria. *Gallus*. Laguesse, E. 1912a.

Tissue culture. Levaditi, C. & Gabrek, F. 1914.

Blood

General. Mori, K. 1929.

Supravital and vital staining of blood corpuscles. *Gallus*. Mori, K. 1928, 1929.

PHOTOGRAPHY

Book. Text in English. Beetham, B. 1911.

General. Chapman, F. M. 1900a. Birds of prey. La Fuye, M. 1917.

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Direct approach to wild birds. Dawson, W. L. 1914.

Electric current used. Bailey, G. A. 1914.

Examination of commercial eggs by transmitted light. Boyer, J. 1918.

Food of nestling birds determined. Cahn, A. R. 1914.

History of bird photography in America. Gross, A. O. 1933.

Tables for focussing, depth of focus and size of objects in image at various distances. Gilbert, P. A. 1925.

Cinematography

Moving pictures of cells growing and in movement in tissue culture. *Gallus*. Comandon, J., Levaditi, C., & Muter-milch, S. 1913.

Use of moving pictures in embryology. Gräper, L. 1926, 1929a, b.

PRESERVATION

Birds preserved as mummies. Frenzel, J. 1891.

Eggs in collection. Fleury, E. 1920. Preserving eggs and nests of birds. Bendire, C. E. 1891.

Phenol preservation methods. Parker, H. W. 1870.

Preserving embryos. Boyle, R. 1666.

Stomach contents of birds preserved and arranged in glass-covered boxes. Stoner, E. A. 1933.

Preservation of eggs for culinary purposes

General. Comby, E. 1908; Dvorachek, H. E. & Stout, S. R. 1918; Eichelbaum, G. 1916; Ferrand, E. 1874; Jeffrey, J. S. 1905.

Eggs eventually become rancid. Dumartheray, H. 1924.

VARIOUS GASES AND SOLUTIONS

General. Crace-Calvert, F. 1873.

Water-glass preservation. Evéquoz, A. & Häussler, E. P. 1913.

QUANTITATIVE TECHNIC

Calculating coefficients of digestibility of food. Heller, V. G., Morris, L., & Shirley, H. E. 1930.

Estimating stomach contents of wild birds. Collinge, W. E. 1918a.

Measurements

Air resistance and work in flight. Liais, E. 1861.

Altitude of flight. Clayton, H. H. 1897a, b; Kleiner, H. 1907.

Body. Reichenow, A. 1891b, 1906.
Feather elements. Juhn, M. & Fraps, R. M. 1934.

Heat production. Measured by graphic method. Brody, S., Funk, E. M., & Kempster, H. L. 1932.

Interstitial tissue in testis, amount of. Benoit, Jacques 1923h.

EGG MEASURING

General. Fatio, V. 1865.

Calculation of surface area of eggs. Dunn, L. C. & Schneider, M. 1923.

Capacity of eggs. Hoxie, W. 1890b.

SKELETON MEASURING

General. Blasius, W. 1885b.

Instrument for rapid measurements of sternum. Balducci, E. 1910.

Weighing methods

Body weight. Myers, E. C. 1928.

Egg weighing in relation to egg production. Jull, M. A. 1930a.

Estimating mean egg weight per bird. *Gallus*. Godfrey, A. B. 1933.

Parts of eggs. Curtis, M. R. 1912.

RECORDING AND DESCRIPTION

Heart contractions. *Columba*. Brown, T. G. 1909.

Life histories. Felger, A. H. 1902.

Nesting activities. Kendeigh, S. C. & Baldwin, S. P. 1930.

Voice recording

General. Jones, H. B. 1926.

Diagrams for bird songs. Book. Text in English. *Saunders, A. A. 1935.

Sound photography. *Brand, A. R. 1932, 1935.

Use of musical scale. *Féris, F. 1917.

Use of stop watch. Craig, W. 1913a.

SURGICAL TECHNIC

Book. Text in German. Spemann, H. 1923.

General. *Gallus*. Nonidez, J. F. 1924c. *Gallus* embryo. Clark, E. R. 1920.

Use of chloroform in operations. Müller, Theodor 1876.

USE OF TELESCOPE IN OBSERVING FLYING BIRDS

General. Bray, R. A. 1895; Hausman, L. A. 1929.

Determining altitude of flight. Carpenter, F. W. 1906a, 1907; Evershed, J. C. 1895; Kleiner, H. 1907.

Observing birds at night. Chapman, F. M. 1888, 1894.

TEMPERATURE

See also under Adaptation, Aviculture, Behavior, Ecology, Embryology, Physiology, and Poultry culture. This section includes body temperature and effects of external temperatures.

BODY TEMPERATURE

Books. Text in English. Includes birds. Davy, J. 1839. *Lagopus scoticus*. Wilson, E. A. 1911b.

Text in Latin. Includes *Gallus*. Ferdinando, E. 1621.

General. Fabani, C. 1894c; Gröbbels, F. 1928, 1930; Headley, F. W. 1893a; Kendeigh, S. C. & Baldwin, S. P. 1930; Weber, J. A. 1918. Many species. Hildén, A. & Stenbäck, K. S. 1915, 1916; Löer, F. 1909e; Martins, C. F. 1858a; Rey, J. G. 1902; Stoner, D. 1937a; *Wetmore, A. 1921b. Include birds. Davy, J. 1825; Müller, C. 1898. Diving and swimming birds. *Simpson, S. 1913. Migrating birds. Gröbbels, F. 1930. Nestling altricial birds. Many species. Gardner, L. L. 1930. Newly hatched chicks. *Gallus*. Card, L. E. 1921a; Davy, J. 1865, 1869; Fronda, F. M. 1921, 1923.

South Australia. Morgan, A. M. 1920, 1922.

Alca. Martins, C. F. 1858a. *Anas*. Hári, P. & Kriwusch, A. 1918; Martins, C. F. 1856a, b. Anatidae. Cornevin, C. E. & Lesbre, F. X. 1894; Martins, C. F. 1856b. *Anser*. Hári, P. 1917; Martins, C. F. 1856a. *Bubo v. virginianus*. Gardner, L. L. 1929. *Columba*. Dulong, P. L. 1841; Löer, F. 1910a. *Dromaeus* [*Dromiceius*] *novae-hollandiae*. Zawadowsky, M. M. 1926e. *Gallus*. Féris, C. 1899d; Löer, F. 1909b;

Saint-Loup, R. 1901b. *Hirundo erythrogaster*. Stoner, D. 1935b. *Hypo-leucus*. Morgan, A. M. 1917b; White, S. A. 1918. Laridae. Martins, C. F. 1856b. *Larus*. Martins, C. F. 1856a, 1858a. *Leipoa*. Morgan, A. M. 1917a. *Lestris*. Martins, C. F. 1858a. *Microcarbo*. Morgan, A. M. 1917b; White, S. A. 1918. *Mormon*. Martins, C. F. 1856b, 1858a. Phalacrocoracidae. Morgan, A. M. 1916a. *Phasianus*. Löer, F. 1910a. *Procellaria*. Martins, C. F. 1856a, b, 1858a, c. *Procellariiformes*. Brown-Séguard, C. E. 1858a. *Struthio*. Duerden, J. E. 1912c. *Uria*. Martins, C. F. 1856a, b, 1858a.

Ability of epidermis to transmit radiated heat. Rauber, A. A. 1886.

Age. Effects on body temperature. *Anas* & Anser. Löer, F. 1909c. *Gallus*. Brody, S., Funk, E. M., & Kempster, H. L. 1932; Mitchell, H. H., Card, L. E., & Haines, W. T. 1927.

Body temperature of brooding hen during incubation. *Gallus*. Simpson, S. 1911.

Cooling of skin, laws of. *Anas* & *Gallus*. Lefèvre, J. 1897.

Critical body temperature. *Gallus*. Mitchell, H. H. & Haines, W. T. 1927.

Development of control of body temperature in nestlings. *Troglodytes aëdon*. Kendeigh, S. C. & Baldwin, S. P. 1928.

Effect on radio-sensitivity of egg. Ancel, P. & Vintemberger, P. 1927.

Effect of sex on basal heat production. *Gallus*. Mitchell, H. H., Card, L. E., & Haines, W. T. 1927.

Egg temperatures in relation to body temperature during incubation. *Gallus*. Saint-Loup, R. 1901b.

Normal and tuberculous body temperature compared. *Gallus* & *Meleagris*. Klimmer, M. & Saalbeck, —. 1910a.

Seasonal changes. Effects on body temperature. *Gallus*. *Simpson, S. 1912.

Variation in body temperature. *Columba*. Ott, I. 1893.

Blood temperature

General. Many species. Löer, F. 1909a.

Effect of sex on blood temperature. *Anser*, *Meleagris*, & *Phasianidae*. Löer, F. 1910b.

Experimental studies of body temperature

Causes of heat production. *Columba* & *Gallus*. Despretz, C. 1824.

Relation to cerebral hemispheres. *Columba*. Rogers, F. T. 1920c.

EXPERIMENTAL MODIFICATION

General. *Columbidae*. Riddle, O. & Smith, G. C. 1935.

Effects of castration on basal heat production. *Gallus*. Mitchell, H. H., Card, L. E., & Haines, W. T. 1927.

Effects of decerebration. *Columba*. Rogers, F. T. 1919b.

Effects of excessive dose of thyroid extract. *Gallus*. Martin, J. H. 1929a.

Results of lesion of brain stem

General. *Columba*. Rogers, F. T. 1923.

Destruction of thalamic heat-regulating center. *Columba*. Rogers, F. T. & Laekey, R. W. 1923; Rogers, F. T. & Wheat, S. D. 1921.

Lesions of thalamus and their effects. *Columba*. Rogers, F. T. 1919b, 1921a.

Pituitary gland extract. Effects on birds rendered poikilothermous by diencephalon lesions. *Columba*. Rogers, F. T. 1921a.

Heat production

Blood corpuscles. Calory quotients. *Anser*. Meyerhof, O. 1912.

Diets deficient in vitamin B. *Columba*. Farmer, C. J. & Redenbaugh, H. E. 1925b.

Oxidation processes. Meyerhof, O. 1911.

Measurements of body temperature

General. Boden, —. 1908.

Rectal readings. Many species. Löer, F. 1909e. *Apteryx*, *Casuaris*, *Crypturiformes*, *Fringilliformes*, *Gallus*, *Passeriformes*, & *Struthio*. Sutherland, A. 1899.

Regulation of body temperature

General. Includes birds. Leichten-tritt, B. 1919a.

Regulation in brain. *Columba*. Rogers, F. T. 1919b, 1920b.

Relation of body temperature to external temperature

General. Columbidae. Lapique, L. & Lapique, M. 1909c.

Resistance to cold. Milne-Edwards, A. 1882.

Variations in body temperature

General. Galbraith, J. J. & Simpson, S. 1904; Hildén, A. 1915.

Diurnal variations. Many species. Hildén, A. & Stenbäck, K. S. 1916. Includes birds. Simpson, S. & Galbraith, J. J. 1905.

REACTIONS TO EXTERNAL TEMPERATURE

General. *Larus argentatus*. Strong, R. M. 1914.

Before and after hatching. *Gallus*. Pembrey, M. S. & Gordon, M. H. 1894.

Contraction of cardiac muscle. *Columba* & *Gallus*. Hess, W. R. & Ryffel, W. 1923.

Ear labyrinth. *Columba*. Popp, H. 1913.

Egg size and proportions. Goebel, H. 1903.

Food consumption. Birds of various sizes. Lapique, L. & Lapique, M. 1909b. Many species. Stevenson, J. 1933. *Columba*. Larguier des Bancelles, J. 1902.

Heart contraction rhythm. *Gallus*. Lewis, W. H. 1924.

Heat effects. Taylor, H. R. 1893b; Willford, A. H. 1925.

High temperatures. Effect on food consumption of small birds. Lapique, L. & Lapique, M. 1909a.

Metabolism effects. Columbidae. Riddle, O., Smith, G. C., & Benedict, F. G. 1934.

Production of carbon dioxide. Lettelier, F. 1845.

EFFECTS ON SINGING

General. Fowler, W. W. 1899.

Time of ending of evening song of mockingbird as affected by tempera-

ture. *Mimus p. polyglottos*. Shaver, J. M. & Walker, G. 1930.

Low temperature

General. Cretté de Palluel, A. 1899a; Gould, C. 1917; Mosley, O. 1869; Norguet, A. 1870; Whitney, E. R. 1893. Many species. Wattebled, G. E. 1880.

Captive birds. Cornély,—. 1875.

Fibroblasts. Includes *Gallus*. Fischer, A. 1926.

Migrating birds. Germany. Troller, J. 1913.

Small birds. Morris, R. T. 1876.

COLD WAVE

General. Many species. Meylan, O. 1922.

Severe cold. Booth, H. B. 1917; Carroll, C. J. 1917; Hancock, J. L. 1888a; Rowan, W. 1925b, 1927b.

TOLERANCE FOR LOW TEMPERATURE

General. Latour, B. 1912. Birds incidental. Courbet, P. 1912. Tropical birds. Hessler, A. 1854b.

Ability of many migrating birds to spend winter in far north. Gloger, C. W. 1860e.

Resistance to cold when in higher latitudes. Includes birds. Weir, J. J. 1865.

Reaction of embryos to temperature

See also under Embryology.

Changes in temperature. *Gallus*. Pembrey, M. S., Gordon, M. H., & Warren, R. 1894.

Gradient. *Gallus*. Tazelaar, M. A. 1928.

Temperature experiments in incubation. *Gallus*. Dareste, C. 1856a, 1865c, 1866a, 1869a, 1889c; Féré, C. 1894e; Philips, A. G. 1916b; Philips, A. G. & Brooks, F. D. 1923; Saint-Loup, R. 1890b; Salvioli, I. 1899.

HIGH TEMPERATURE

General. *Gallus*. Féré, C. 1900c.

Lung diverticulum. *Gallus*. Weber, A. 1918.

LOW TEMPERATURE

General. *Gallus*. Labbe, E. H. 1925; Lamson, G. H. 1918; Lipschütz, A. & Illanes, A. 1929; Mauro, F. 1923; Moran, T. 1925.

Physiological zero

General. *Gallus*. *Edwards, C. L. 1900, 1902; Eycleshymer, A. C. 1907; Kaestner, S. 1895; Kempen, C. 1901b; Rabaud, E. 1899b; *Tirelli, V. 1899, 1900.

Not destroyed by temperature of 5° F. *Gallus*. Davy, J. 1864a.

TERATOLOGY

This section includes various types of abnormalities, anomalies, monsters, etc. See also under **Embryology**, **Pathology**, **Sex**, and **Variation**. For abnormalities in color, including albinism, see under **Coloration**.

Books. Text in French. Geoffroy Saint-Hilaire, I. 1837a; Larcher, O. E. 1873-78; Serres, A. E. 1860a. Include birds. Geoffroy St. Hilaire, E. 1822c, 1827; Moreau de la Sarthe, J. L. 1808. Birds incidental. Jourd, G. 1806.

Text in German. Tiedemann, F. 1810-14. Includes Trochilidae. Hartert, E. J. 1900a.

Text in Latin. Many species and numerous plates often fanciful. *Aldrovandus, U. 1610-13, 1642. *Columba* & *Gallus*. Heusner, C. C. 1824.

General. Albani, G. 1898; Boie, E. K. 1885; Brogi, S. 1898, 1903; Davaine, C. J. 1875; Ferrer de Valdecebro, A. 1883; Hagen, W. 1910a; Hanaeus, G. 1690a; Landois, H. 1873; Lehmann, E. 1913; Nollet, J. A. 1750; Parona, C. 1883; Sacerdotti, C. 1895; Schneider, K. M. 1928; Wolff, C. F. 1772. Include birds. Mitrophanov, P. I. 1897d, g; Simmermacher, G. 1883. Miscellaneous cases in a collection. Anfrue, E. 1917.

Anas. Soubeiran, J. L. & Luton, A. 1856; Anon. 1688. Includes *Anas*. Diard,—. 1905. *Anas boschas*. Rowley, G. D. 1873. *Columba*. Grevé, C. 1896. *Cygnus olor*. Weinland, D. F. 1862a. *Delichon u. urbica*. Ulmer,—. 1852. *Gallus*. Balbi, P. B. 1745; Constantin, P. 1894; Conte, A. 1910a; Eudes-Deslongchamps, E. 1861-62; Faber,—. 1852; Francus de Frankenau,

G. F. 1727a; Graff, C. 1737; Graiño Caubet, C. 1905; Heaman, M. T. 1918; Kaestner, S. 1897; Landauer, W. 1930a; Leblond, C. 1834a, 1840; Möller,—. 1839; Moriggia, A. 1879; Pascal,—. 1840; Paterson, A. M. 1886-87; Postel, G. 1911; Pouchet, G. 1879; Sangalli, G. 1888; Schott, R. G. & Curtis, V. 1928; Soubeiran, J. L. & Luton, A. 1856; Sun, T. P. 1932. Include *Gallus*. Diard,—. 1905; Geoffroy, E. L. 1755; Rauber, A. A. 1879. *Larus*. Graiño Caubet, C. 1905. *Parus*. Parona, C. 1879. *Passer*. Fabani, C. 1891; Marshall, W. A. 1896.

Anomalies subject to same laws of development as normal. Lavocat, A. 1863.

Classification of monsters and various abnormalities. Includes birds. Dareste, C. 1869d.

Giants and dwarfs. *Gallus*. Rensch, B. 1923a.

Omphalosite. Monster not capable of existence after hatching. Causes. Dareste, C. 1865g, 1873c, 1889b.

Relation of production of anomalies to period after laying. Dareste, C. 1886a.

Viability of monsters. *Gallus*. *Dareste, C. 1863d.

CAUSES OF ANOMALIES

General. Includes birds. Panum, P. L. 1878. *Gallus*. Hutt, F. B. & Pilkey, A. M. 1930.

Arrested development as cause. Dareste, C. 1862a, 1869e.

Egg weight not significant in formation of monsters. Féré, C. 1895e.

Embryonic inclusions. *Gallus*. Tur, J. 1905b.

Hyperfecundation or failure of fertilization. Duval, M. M. 1895.

Modifications in form of body due to modifications of neural tube. Ferret, P. & Weber, A. 1904f.

DOUBLE MONSTERS

Supernumerary limbs or digits are included in the subdivision under Polymelia.

Books. Text in German. Includes birds. Panum, P. L. 1860. *Gallus*. Baer, K. E. 1845; *Gerlach, L. 1882a.

Includes *Gallus*, *Passer*, & *Sturnus*.
Klaussner, F. 1890.

Text in Latin. Aldrovandus, U.
1610-13, 1642.

General. Dareste, C. 1865e; Kříženecký, J. 1926b; Landois, H. 1878b.

Anas. Thunberg, C. P. 1827. *Anas boschas*. Zenkewitsch, L. A. 1922. *Columba*. Thunberg, C. P. 1827. *Gallus*. Anthony, R. L. & Salmon, J. 1900; Brückner, G. 1913; Charlier, E. 1873; Chidester, F. E. 1926; Fenizia, C. 1897; Lassère, R. 1878; Müller, H. F. 1859; Sangalli, G. 1888; Thunberg, C. P. 1827; Tur, J. 1905c. Includes *Gallus*. Landois, H. 1888b. *Phasianus*. Thunberg, C. P. 1827.

Anatomy. *Gallus*. Bhattacharya, D. R. 1918; Broom, R. 1897.

Diplogenesis

Production of double monsters.

General. *Gallus*. Rauber, A. A. 1877a; Tur, J. 1913a, 1920.

CAUSES

General. Dareste, C. 1864d, 1865a.

Polyspermy. Duval, M. M. 1895.

Doubling of various structures

Heart. *Columba*. Constantinescu, C. I. 1900. *Gallus*. Littré, A. 1733; Panum, P. L. 1859a, b. *Meleagris*. Smith, A. J. 1901. *Perdix*. Aboville, F. M. 1786.

Spinal cord. *Gallus*. Richter, W. 1887b.

Tracheal artery. *Columba*. Portal, A. 1774.

PELVIC AND CLOACAL REGION

General. *Gallus*. Albrecht,—. 1909.

Anus. *Columba*. Portal, A. 1774. *Gallus*. Crew, F. A. 1928b; Mégnin, J. P. 1896; Roberts, E., Card, L. E., & Boyden, E. A. 1929.

Cloaca. Mégnin, J. P. 1896.

Two pelvises and four legs. *Gallus*. Oka, H. 1926.

SKELETON

General. *Gallus*. Dugès, Alfredo 1902.

Double skeleton, caudal to neck. *Gallus*. Jaquet, M. 1924.

Parietal bone of skull. *Pygoscelis*. Pycraft, W. P. 1907i.

Various types of double monsters

Anadidyms. United but separated rostrally. *Gallus*. Hoffmann, E. 1893. Includes *Gallus*, *Passer*, & *Sturnus*. Klaussner, F. 1890.

Anideus. Twin monsters where one is a shapeless mass. *Corvus* & *Gallus*. Tur, J. 1907e.

Asymmetrical double monster. *Gallus*. Taylor, N. 1919.

Autosite. Monster capable of independent existence which may have a parasitic twin. Dareste, C. 1876c.

Deradelphus. Single head and neck. *Columba*. Quatrefages de Bréau, J. L. 1839, 1878. *Gallus*. Bert, P. 1863; Dareste, C. 1894.

Dicephalus. Two heads. Man, J. G. 1878. *Columba*. Böhm, J. 1687; Anon. 1688.

Diprosopus. Monster with two faces. *Anas*, *Columba*, & *Gallus*. Davaine, C. J. 1850.

Endocyma. Parasite contained in body of autosite. Tur, J. 1905b. *Gallus*. Tur, J. 1912a.

Metopagus. Joined at the forehead. *Anas*. Gervais, H. 1874.

Monosomus. Double monster with only one body. *Gallus*. Chainé, J. 1903a, 1904a.

Opodidyms. Doubling of face. *Gallus*. Fenizia, C. 1897.

Parabiosis. Union of two individuals. *Gallus*. Fasiani, G. M. 1913.

Pygomelus. One of twin monsters parasitic upon other and more or less inferior in its development, often only a fleshy mass. Larcher, O. E. 1872b. Many species. Parona, C. 1880, 1883. *Anas*. Diard,—. 1897; Gadeau de Kerville, H. 1884b; Lataste, F. 1923b. Includes *Anas*. Lesbre, F. X. 1902. *Gallus*. Bricon, P. 1884; Charlier, E. 1873; Konopacki, M. 1910; Lataste, F. 1897-98, 1923b; Lesbre, F. X. 1902; Tur, J. 1912a.

Rostral and caudal regions double. *Gallus*. Dareste, C. 1863e.

Sternopagia. Fusion at sternum. *Gallus*. *Rabaud, E. 1901b. *Meleagris*. Floyer, J. 1699.

Synadelphus. Four wings and four feet. *Anas*. Neugebauer, F. L. 1897. *Gallus*. Faber,—. 1852; Hévin, P. 1681; Musy, M. 1912; Neugebauer, F. L. 1897; Rouchy, C. 1879.

Thoradelphus. Fused from navel cephalad. Lavocat, A. 1864.

Ischiopagus (Ischlodidymus)

Bodies united in pelvic region.

General. *Gallus*. Dareste, C. 1862d; Féré, C. 1903a.

Cloaca doubled and each cloaca separate, also two supernumerary feet. *Gallus*. Bonnet, A. 1914.

Heteromorphic type. One twin complete, the other having no head and only a trace of a thorax. *Gallus*. Dareste, C. 1862h.

Monocephalus (Syncephalus)

One head or two fused heads.

General. Lavocat, A. 1864; Skriabina, K. 1908f. *Gallus*. *Rabaud, E. 1901b.

Embryological study. *Gallus*. Keilin, A. 1916.

DOUBLE EMBRYOS

General. *Anas*. *Kaestner, S. 1907; Tur, J. 1913b. Includes *Anas*. Grundmann, E. 1900. *Anser*. Reichert, C. B. 1864. Includes *Anser*. Grundmann, E. 1900. *Gallus*. Baer, K. E. 1827b; Banchi, A. 1895, 1896; Bhaduri, I. L. 1929; Bonmariage, A. & Petrucci, R. 1899; Bryce, T. H. 1900; Cook, M. T. 1903; *Davaine, C. J. 1860; Doenitz, F. C. 1866; *Kaestner, S. 1898b, 1899, 1901, 1902, 1907; Mankowsky, A. 1906; Mitchell, P. C. 1891; Motomura, I. 1928; O'Donoghue, C. H. 1910; Rauber, A. A. 1877a; Reichert, C. B. 1864, 1912; Spencer, W. B. 1890; Tannreuther, G. W. 1919; Terni, T. 1925a; Tur, J. 1912b. Includes *Gallus*. Grundmann, E. 1900.

Anadidymus. United caudally but separated rostrally. *Gallus*. Hoffmann, E. 1893.

Blood vessels. *Gallus*. Wucher, O. 1900.

Development of double embryos. Birds incidental. Windle, B. C. 1889. *Anas*. Dareste, C. 1862c; Ruth, E. S. 1916-18. *Columba*. Dareste, C. 1862c. *Gallus*. Dareste, C. 1862c, 1869c.

Partially double embryo. *Gallus*. Lucas, A. H. 1890.

Relations of embryonic membranes of twin embryos from double-yolked egg. *Gallus*. Sumulong, M. D. 1925.

Doubling of various embryonic structures

Primitive streak. *Gallus*. Burckhardt, K. R. 1888.

Blastoderm

General. *Gallus*. Mitrophanov, P. I. 1899b.

Anidean blastoderms. Shapeless. Origin. Tur, J. 1907c.

Neural tube

General. *Gallus*. Ferret, P. & Weber, A. 1904h; Gawrilenko, A. 1924; Rabaud, E. 1902.

Accessory neural tube. *Gallus*. Lunghetti, B. 1911a.

Spinal cord. Partial doubling. *Gallus*. Cutore, G. 1899.

EGG ABNORMALITIES

Books. Text in German. Durski, S. P. 1907; Panum, P. L. 1860; Tiedemann, F. 1810-14. Text in Latin. Langly, W. 1674a; Schrader, J. 1674.

General. Behr, G. H. 1742; Büttner, C. T. 1773; Guyer, M. F. 1899; Ingersoll, A. M. 1910; Jacobs, J. W. 1898; K., T. 1880; Landois, H. 1887; Marshall, T. H. 1907; Monti, C. 1757; Napier, C. O. 1868a; Palier, J. C. 1768; Pick, E. W. 1911; Reisel, S. 1683; Röttiger, A. 1878a, 1879; Rommel, P. 1687a; Shufeldt, R. W. 1916b; Tegetmeier, W. B. 1894. Many species. König-Warthaussen, R. 1885. Wild species. M'William, J. M. 1927.

Agapornis cana. Felice, T. 1905. *Anas*. Garmann, C. F. 1670a; Le-feuvre,—. 1906; Nathusius, W. 1882b; Newnham, W. O. 1845; Piccone, E. 1891. *Anser*. Kruse,—. 1866; Kutter, O. F. 1880; Panum, P. L. 1863. *Columba*. Leonardi, C. 1896; Panum, P. L. 1863. *Fulica americana*. Wetmore, A. 1917a. *Gallinula*. Landois, H. 1898b. *Galloparo*. Gahrlipe, G. C. 1697-98. *Gallus*. Bernard, P. 1889; Boggio-Marzet, S. 1922; Büchner, J. G. 1742; Chassignol, F. 1912, 1924; Chatin, J. 1883; Chidester, F. E. 1915; Cleyer, A. 1683a, b; Condorelli Francaviglia,

M. 1919-20, 1923; Demours, D. E. 1778; Dupuy, —. 1839-41; Eberhardt, —. 1863a; Francus de Frankenau, G. F. 1727c; Garmann, C. F. 1670a; Gay, M. 1901; Gerbezius, M. 1700; Gockel, E. 1688; Grañño Caubet, C. 1905; Hannaeus, G. 1690b; Hargitt, C. W. 1899; Hoffmann, J. M. 1689; Isakov, M. 1911; Jäckel, A. J. 1867b; Kunstler, J. & Brascassat, M. 1901; Kutter, O. F. 1880; Laborde, J. B. 1862; Landois, H. 1878a, 1894c, 1895, 1898b, 1902a, b; Lapeyronie, F. G. 1732; Lataste, F. 1923c; Legros, A. 1913; Leonardi, C. 1896; Liégeois, A. T. 1859; Linstow, O. 1898; Longinos Navás, R. P. 1906; Mensa, A. 1921; Merkel, F. J. 1859; Minà-Palumbo, F. 1890; Mingaud, G. 1912; Morand, S. 1718; Nathusius, W. 1893a; Oseretskovski, N. 1798; Panum, P. L. 1863; Parona, C. & Grassi, B. 1877; Paullin, C. F. 1706; Péguin, P. 1908; Polis, G. S. 1686b; Réaumur, R. A. 1753; Respingeri, J. H. 1751; Rey, J. G. 1905a; Rivet, —. 1896; Roberg, —. 1892; Rouget, J. H. 1912; Roux, C. 1923; Schjelderup-Ebbe, T. 1923d; Schmitz, E. 1906; Schultz, S. 1672; Sreta, H. 1672-74; Siedamgrotzky, —. 1874; Skriabina, K. 1908a; Szuman, J. G. 1926a; Taruffi, C. 1886; Toni, E. 1891; Anon. 1720, 1778. *Larus ridibundus*. Krause, G. A. 1904. *Muscicapa*. Landois, H. 1898b. *Psittacula*. Felice, T. 1905. *Ruticilla*, *Sylvia*, & *Upupa*. Landois, H. 1898b.

Air space at sharp end. Schmidt, C. 1880.

Causes of abnormal eggs. Baudrimont, A. 1923.

Deposits on shell. *Gallus*. Robinson, J. 1874.

Hourglass type. Chatin, J. 1879. *Phasianus* & *Tetraonidae*. Tegetmeier, W. B. 1904.

Incubation. *Gallus*. Broca, P. 1862.

Perforation. Lataste, F. 1925a.

Striations in shell. *Aepyornis*. Joly, N. 1868a.

Very large eggs. *Anser*. Iwersen, —. 1876. *Gallus*. Hannaeus, G. 1686b.

Weak shell. *Gallus*. Panum, P. L. 1863.

Yolk formation abnormal. *Gallus*. *Riddle, O. 1912a.

Yolkless egg. Lataste, F. 1923a, c.

EGG ENVELOPES

Abnormal eggs. *Gallus*. Lataste, F. 1924b.

Shell membrane anomalies. Lataste, F. 1922.

Dwarf eggs

General. Many species. Standen, R. 1880. *Gallus*. Pearl, R. & Curtis, M. R. 1916a, b; Péguin, P. 1908.

No yolk. *Gallus*. Lapeyronie, F. G. 1732; Rouget, J. H. 1912; Tolmer, L. 1928; Willey, A. 1903.

Thickness of shell. Schönwetter, M. 1925.

Multiple eggs

DOUBLE EGGS

Book. Text in German. *Gallus*. Durski, S. P. 1907.

General. Dareste, C. 1865e; *Guyer, M. F. 1899; Kunstler, J. 1907a; Mitrophanov, P. I. 1897b; Napier, C. O. 1868a; Tur, J. 1902a; Yates, J. 1868.

Anas. Crisp, E. 1877a; Dareste, C. 1862c; Enderle, J. 1902. *Columba*. Dareste, C. 1862c, 1865e; *Guyer, M. F. 1899. *Corvus* & *Fringilla*. Wiese, G. 1867b. *Fulica atra*. Steinmetz, H. 1930. *Gallus*. Bauer, R. W. 1898; Chiffot, J. 1896; Curtis, M. R. 1916; Dareste, C. 1860b, 1862c, 1865e; Davaine, C. J. 1860; Eberhardt, —. 1863a; Enderle, J. 1902; Fritsch, G. 1895; Gadeau de Kerville, H. 1907; Hargitt, C. W. 1899, 1912; Justov, N. L. 1927; Kutter, O. F. 1880; Mitrophanov, P. I. 1898e; Panum, P. L. 1863; Parker, G. H. 1906; Patterson, J. T. 1911; Reeker, H. 1907a; Schmitz, E. 1906; Schumacher, S. 1896. *Lanius*. Wiese, G. 1867b. *Larus ridibundus*. Krause, G. A. 1904. *Milvus* & *Picus*. Wiese, G. 1867b. *Struthio*. Duerden, J. E. 1910b. *Turdus*. Wiese, G. 1867b.

Connected by isthmus, i.e. dumb-bell-shaped. Hannaeus, G. 1686a. *Gallus*. True, N. T. 1866.

Structure. *Gallus*. Immermann, F. 1899.

United at ends by band. *Gallus*. Cormack, —. 1850.

EGG IN EGG

Books. Text in German. Seidlitz, G. K. 1869. *Gallus*. Durski, S. P. 1907; Peregrinus, C. 1913.

Text in Latin. *Gallus*. Langly, W. 1674a; Schrader, J. 1674.

General. Abolina, L. 1923; Altum, B. 1865a; Amelot, J. J. 1745; Ashley, W. H. 1850; Bartholinus, T. 1670; Behr, G. H. 1742; Elsholz, J. S. 1675-76; Faivre,—. 1906; *Guyer, M. F. 1899; Jung, G. S. 1671; Justov, N. L. 1913; Kummer,—. 1910; Kunstler, J. 1907a; LeJuge, E. 1872; Minervini, G. 1871; Perrault, C. 1730; Philippi, R. A. 1893; Retzius, A. A. 1847; Rosnатовsky, J. P. 1927; Stein, F. 1870; Vallemont, P. L. 1697; Velsch, G. H. 1673a; Anon. 1872b.

Anas. Enderle, J. 1902; Jamet, M. 1906; Wahlgren, F. 1871. *Anser*. Brockholes, J. F. 1857; Kutter, O. F. 1880; Lowther, J. 1757; Wahlgren, F. 1871; Weber, L. 1897a. *Columba*. *Guyer, M. F. 1899. *Cygnus*. Aveling, E. B. 1877. *Gallus*. Aveling, E. B. 1877; Bambeke, C. 1884; Barnes, R. 1863, 1885; *Baudouin, M. 1911; Beauchamp, P. 1909; Bert, P. 1862; Borrichius, O. 1677-80; Camerano, L. 1889; Cattaneo, G. 1879; Chobaut, A. 1897; Claparède, E. 1864; Condorelli Francaviglia, M. 1919-20; Detharding, G. 1712; Diorio, V. 1871; Dublancq-Laborde, R. 1912; Faivre,—. 1906; Féré, C. 1902b; Gruvel, A. 1901, 1902; Hargitt, C. W. 1899, 1912; Henneguy, L. F. 1911, 1912; Herrick, F. H. 1899; Hicks, J. S. 1881; Joly, N. 1868b; Joy, N. 1918; König-Warthaussen, R. 1885; Krause, G. A. 1905; Kunstler, J. & Brascassat, M. 1901, 1902; Kutter, O. F. 1880; Landois, H. 1882d, 1886b, 1898b; Landrieu, L. 1911; Lataste, F. 1923c; Loewer, E. 1896; Maurice, E. F. 1875; Méry, J. 1731; O'Donoghue, C. H. 1910; Panum, P. L. 1863; Parker, G. H. 1906; Petit, J. L. 1745; Prince-teau,—. 1913; *Racah, M. 1922; Raeymaekers, D. 1898; Schiller-Tietz, N. 1903; Schmitz, E. 1906; Schmitz, E. & Feltgen, E. 1907; Schumacher, S. 1896; Sommer, J. G. 1683; Supino, F. 1897; Teycheney, L. 1923; Thiele, H. 1889; Vaillant, L. 1875; Wahlgren, F. 1871; Anon. 1873b. *Lanius*. Landois, H. 1892. *Meleagris* & *Psittacus*. Iwersen,—. 1876.

Cause of egg in egg. *Gallus*. Baudouin, M. 1913.

Each egg showing imprint of vascular area. Diorio, V. 1871.

INCUBATION RESULTS

General. *Gallus*. Immermann, F. 1899.

No blastoderm. Tur, J. 1909b.

Positions of embryos. *Gallus*. Féré, C. 1897i, 1898a, d.

Twenty-three out of eighty-two double eggs incubated developed embryos, all separate. *Gallus*. Panum, P. L. 1863.

Two birds from single egg. *Struthio*. Duerden, J. E. 1910b.

Two yolks in abdomen of 7-day chick. Houssay, F. 1903b.

TWO OR MORE YOLKS IN EGG

General. Hagendorn, E. 1671; Kummerlöwe, H. 1931a; Anon. 1877b.

Anas. Cabanis, J. L. 1889. *Anser*. Nathusius, W. 1872; Panum, P. L. 1863. *Erythacus*. Bryon, H. S. 1888. *Gallus*. Baer, K. E. 1827b; Bartels, M. K. 1895; Broca, P. 1861; Bruch, C. W. 1866; Curtis, M. R. 1914c; Eberhardt,—. 1863a; Fritsch, G. 1895; Harvie-Brown, J. A. 1868; Möbius, K. A. 1895; Panum, P. L. 1863; Schiller-Tietz, N. 1903; Seger, G. 1672; Sumulong, M. D. 1925.

Causes. *Gallus*. *Curtis, M. R. 1914c, 1915b.

Origin. *Gallus*. *Glaser, O. 1913.

Shell thickness. Schönwetter, M. 1925.

Triple-yolk eggs

General. Clarke, T. B. 1932; Guyer, M. F. 1899; Kunstler, J. 1907a; Napier, C. O. 1868a; Pearl, R. 1910c.

Includes *Alauda* & *Anas*. Valenciennes, A. 1856. *Columba*. Guyer, M. F. 1899; Valenciennes, A. 1856. *Cygnus* & *Fringilla*. Valenciennes, A. 1856. *Gallus*. Chatin, J. 1887; Curtis, M. R. 1914c; Eberhardt,—. 1863a; Valenciennes, A. 1856.

Three separate embryos in one egg. *Gallus*. Hancock, J. L. 1891.

EMBRYONIC ANOMALIES

General. Tur, J. 1903a, 1910a. Includes birds. Panum, P. L. 1878. *Gallus*. Alton, J. S. 1848; Dursy, E.

1867; Gräper, L. 1926; Oseretskovski, N. 1798; Rabaud, E. 1899c; Tur, J. 1901a, 1907d; Yoshida, S. 1910. *Meleagris*. Skriabina, K. 1907a.

Absence of ventral anlage of pancreas. *Gallus*. Weber, A. & Buvignier, A. 1903a.

Arteria pulmonalis, unusual variety. *Gallus*. Krassnig, M. 1913a.

Atresia of esophagus and intestine. Development. Includes *Gallus*. Forschner, H. 1907.

Bifurcation of notochord. *Gallus*. Ryder, J. A. 1886.

Cardiocephalia. *Gallus*. *Tur, J. 1922.

Cause. Malpositions of embryo. *Gallus*. Hutt, F. B. 1929d.

Chondrodystrophia. Embryonic rhachitis. *Gallus*. Hutt, F. B. 1929d; *Landauer, W. 1927b; Landauer, W. & Dunn, L. C. 1925, 1926, 1930a; Sun, T. P. 1932.

Cordentery. Notochord projected into midgut region of 3-day embryo. *Gallus*. Rabaud, E. 1900a.

Exencephalia. *Gallus*. Wassjutotschkin, A. 1913b.

Eye anomalies in embryos. *Gallus*. Hess, C. 1891. Eyes on back of embryo. *Gallus*. Richter, W. 1887b. Book. Text in German. *Gallus*. Richter, W. 1887a.

Heart contractions of abnormal embryos. *Gallus*. Féré, C. 1895l.

Heteromorphism. *Gallus*. Dareste, C. 1862d, h.

Malformation of anterior end of notochord. *Gallus*. Saint-Remy, G. C. 1897.

Multiple embryonic monsters. *Gallus*. Tur, J. 1905a.

Olfactory chambers of a cyclops. *Gallus*. Rabaud, E. 1901c.

Ourenteria. Entrance of neural tube, notochord, and aorta into gut. First described by Rabaud. *Gallus*. Ferret, P. & Weber, A. 1904k; Rabaud, E. 1900a.

Persistence of fourth left branchial arch in 16-day embryo. *Gallus*. Pohlman, A. G. 1920.

Relation of abnormalities to embryonic mortality. *Gallus*. Hutt, F. B. 1929d.

Triple monster. *Gallus*. Fortuyn-van Leyden, C. E. 1927; Rauber, A. A. 1877a.

Unusual relation of notochord to intestine. *Gallus*. Ryder, J. A. 1886.

HEAD

General. *Gallus*. Féré, C. 1894c.

Head in small end of egg. *Gallus*. Byerly, T. C. & Olsen, M. W. 1933.

NERVOUS SYSTEM

General. Development. *Gallus*. Cutore, G. 1900; Drago, U. 1901.

Neural tube

Branching of central canal of neural tube. *Gallus*. Fedorow, V. 1907.

Malformation of neural tube as a cause of abnormal nervous system in embryo. *Gallus*. Ferret, P. & Weber, A. 1904e.

Persistent portion of neurenteric canal. *Gallus*. Ryder, J. A. 1886.

Spinal cord

Accessory canals. *Larus canus* & *Sterna hirundo*. Kolster, R. 1899.

Caudal end. *Gallus*. Mingazzini, P. 1898-99.

Multiple central canals in spinal cord of embryo. *Gallus*. Cutore, G. 1925; Smith, C. A. 1898.

Multiple spinal cord. *Gallus*. Oelacher, J. 1875.

Early embryonic teratology

General. *Gallus*. Mitrophanov, P. I. 1894; Stefanov, N. M. 1913a, b.

Aortic arches. Rare variety of pulmonary artery. *Gallus*. Krassnig, M. 1913a.

Effects of variations in metabolic rate during early development. *Columba* & *Streptopelia*. *Riddle, O. 1923c.

BLASTODERM

General. Dareste, C. 1876a. *Gallus*. Tur, J. 1902c.

Area vasculosa anomalies. Dareste, C. 1876a. *Gallus*. Ferret, P. & Weber, A. 1904c.

Arrested development of area opaca of blastoderm. *Gallus*. Féré, C. 1900g.

Blastoderm without embryo. *Anas*. Weber, A. 1906. *Corvus*. Tur, J. 1908a. *Gallus*. Loisel, G. 1901d; Rabaud, E. 1899a.

Ectoderm anomaly. Szaniawski, W. 1927.

False blastoderm. Tur, J. 1908c.

Parablast anomaly. *Gallus*. Tur, J. 1906b.

Primitive streak

General. *Gallus*. Banchi, A. 1897; Fasola, G. 1889; Mitrophanov, P. I. 1897f.

Extension to margin of blastoderm. *Gallus*. Whitman, C. O. 1883, 1884.

Phylogenetic interpretation. *Gallus*. Fasola, G. 1890.

Presence in area opaca. *Gallus*. Samassa, P. 1890.

EMBRYONIC MEMBRANES

Allantois

General. *Gallus*. Dareste, C. 1876a.

Displacement. Causes. *Gallus*. Dareste, D. 1863b.

Amnion

General. Weber, A. 1902e. *Gallus*. Dareste, C. 1876a.

Adherence of amnion in embryonic monster. *Gallus*. Rabaud, E. 1901a.

Defective amnion. *Gallus*. Cutore, G. 1902.

Folds of amnion entering lens invagination opening. *Gallus*. Szily, A. 1906.

Absence of amnion

General. *Anas*. Weber, A. 1902c, 1903c. *Gallus*. Dareste, C. 1879b; Lillie, F. R. 1903b; Weber, A. 1902c, 1903c.

Accompanying dermal appendage to umbilicus. *Anser* & *Gallus*. Reichert, C. B. 1861.

EXPERIMENTAL TERATOLOGY USUALLY WITH EMBRYOS

See also under **Embryology**: Experimental embryology.

Books. Text in French. Dareste, C. 1891b.

Text in Polish. Tur, J. 1927.

General. Wacquand-Geozelles, S. 1892b. *Gallus*. Cuccati, G. 1890a; Dareste, C. 1861a, b, 1862b, 1863a, b, c, 1864b, c, 1865h, 1868c, e, 1882b, 1883a, 1891a; Doello-Jurado, M. 1914; Féré, C. 1899h, 1900a; Gerlach, L. & Koch, H. 1883; Kaestner, S. 1896, 1897, 1898a, 1899; Koch, H. 1884b; Mitrophanov, P. I. 1895; Ruffini, A. 1919; Schimkewitsch, V. M. 1902a; *Staderini, R. 1913; Szymkiewicz, —. 1876; Tur, J. 1906a, 1908d; Warynski, S. & Fol, H. 1884; Windle, B. C. 1890. *Gallus* incidental. Dareste, C. 1882a.

Area vasculosa anomalies. *Gallus*. Ferret, P. & Weber, A. 1904c.

Fault bars in feathers. *Gallus* & *Turtur* [*Streptopelia*] *risorius*. *Riddle, O. 1908b.

Hypertrophy of spurs from cutting. *Gallus*. Féré, C. 1900e.

Experimental production of various types of abnormalities in embryo

Absence of amnion. *Gallus*. Lillie, F. R. 1903b.

Brain and cord anomalies. *Gallus*. Cutore, G. 1899.

Celosomia. Abdominal hernia. *Gallus*. Dareste, C. 1863d.

Cyclopia. *Gallus*. *Stockard, C. R. 1914; Tur, J. 1906a.

Double heart. *Gallus*. Warynski, S. 1886.

Double monsters. Dareste, C. 1863d, 1873b, d, 1874, 1887b. *Gallus*. Gerlach, L. 1881b; Rauber, A. A. 1877a.

Dwarf embryos. *Gallus*. Gerlach, L. & Koch, H. 1883.

Ectromelia. Autositic monster with imperfect limbs. *Gallus*. Dareste, C. 1863d.

Epithelial proliferation. *Gallus*. Waelsch, L. 1914.

Exencephalia. Malformed brain. *Gallus*. Dareste, C. 1863d.

Heterotaxia. *Gallus*. Dareste, C. 1865b, 1868d, 1870; Fol, H. & Warynski, S. 1883.

Malformations of neural tube. Results of partial or complete closure of the neural tube. *Gallus*. Ferret, P. & Weber, A. 1904e.

Multiple neural tubes. *Gallus*. Waelsch, L. 1914; Weber, A. 1914.

Omphalocephalia. *Gallus*. Kaestner, S. 1906a, b.

Spina bifida. *Gallus*. Peebles, F. 1898; Richter, W. 1888.

Triple monster. *Gallus*. Koch, H. 1884a; Rauber, A. A. 1877a.

Various types of experiments with embryos

Radium emanation. Effects on developing embryo. Tur, J. 1911. *Anas*. Tur, J. 1909a. *Gallus*. Tur, J. 1904, 1905d, e, 1908b.

Respiratory conditions altered. Effects on embryo. *Gallus*. Mitrophanov, P. I. 1900b.

Retarded incubation. *Gallus*. Dareste, C. 1882c.

Subcutaneous injections of morphine into adult bird. *Anas* & *Gallus*. Féré, C. 1897d.

INJECTING TOXIC SUBSTANCES INTO INCUBATING EGG

General. *Gallus*. Féré, C. 1896a.

Alcohol. *Gallus*. Féré, C. 1896j, 1897a.

Creatine into albumen of egg. *Gallus*. Féré, C. 1898e.

TEMPERATURE CHANGE, EFFECTS WITH RELATIVELY

High incubation temperature. *Gallus*. Dareste, C. 1869a.

Low incubation temperature. *Gallus*. Dareste, C. 1856a, 1865c, 1866a, 1869b; Panum, P. L. 1863.

TRAUMATIC EFFECTS

General. *Gallus*. Féré, C. 1897f.

Cauterizing blastoderm. *Gallus*. Lillie, F. R. 1903a, b, 1904a, b.

Jarring egg. *Gallus*. Dareste, C. 1883c, 1885b; Marcacci, A. 1885-86, 1888, 1889.

Lesions in egg envelopes. *Ferret, P. 1905. *Gallus*. Ferret, P. & Weber, A. 1904b, d, i, j.

Mechanical action of shell has unimportant teratologic effect. Tur, J. 1907a.

Vertical position for eggs during incubation. *Gallus*. Geoffroy St. Hilaire, E. 1825.

FANCIFUL DESCRIPTIONS OF TERATOLOGIC CASES

Curious profile of head. *Gallus*. Martius, H. 1829.

Human form of head. *Gallus*. George, M. 1890.

Many strange figures. Books. Text in Latin. Aldrovandus, P. 1610-13, 1642; Licetus, F. 1634.

NANISM (DWARFISHNESS)

General. *Gallus*. Mayhew, R. L. & Upp, C. W. 1932.

Causes. Dareste, C. 1865f.

RACES OF DOMESTIC BIRDS WITH TERATOLOGIC CHARACTERISTICS

General. Regnault, F. 1907.

Tumbler pigeon. Variety of pigeons having habit of tumbling backwards during flight. Some strains do this on ground. *Columba*. Téchoueyres,— 1906.

Crested fowls, notably Polish and Houdan varieties

Good description, with figures of skull and brain modifications. Frontal bones are vaulted, vesicular, and incompletely ossified, with many foramina. The nasal processes of the premaxillaries are largely unossified. The nostril openings of the skull are spread, and the comb is greatly reduced. The cerebral hemispheres are herniated into the vaulted dorsal portion of the skull. *Gallus*. Klatt, B. 1910.

General. *Gallus*. Dareste, C. 1865d, 1867a; Tegetmeier, W. B. 1856, 1901.

Skull hernia. *Gallus*. Houdan fowl. Wassjutotschkin, A. 1913b. *Gallus*. Téchoueyres,— 1906.

TERATOLOGY INVOLVING VARIOUS ORGANS OR PARTS OF THE BODY

Air sac anomalies. Liebe, K. T. 1885; Pallisch, C. 1885; Schmidt, M. 1885.

Taillessness and rumplessness. Variable absence of tail with reduction and fusion of synsacro-caudal vertebrae. *Gallus*. Finn, F. 1892a; Landauer, W. 1927a, b, 1928. Book. Text in German. Libon, G. 1911.

Head

General. *Gallus*. Turnbull, H. M. 1913.

Absence of ear labyrinth on one side. *Columba*. Munk, H. 1878.

Cebocephalia. Monster with defective face. Rabaud, E. 1901d.

Claw on head. *Anas*. Giebel, G. C. 1867.

Cleft palate. *Anas*. Skriabina, K. 1908b.

Exencephalia. *Gallus*. Wassjutotschkin, A. 1913b.

Familial malformation. *Gallus*. Turnbull, H. M. 1913.

Hydrocephalus. Crested fowls. *Gallus*. Klatt, B. 1911; Sangalli, G. 1888.

Spurs on head. *Anser* & *Corvus*. Paullin, C. F. 1687. *Gallus*. Duhamel du Morceau, H. L. 1755; Dexter, E. G. 1898; Lochner, M. F. 1690; Taschenberg, E. O. 1879a.

BEAK

General. Arnold, W. W. 1918; Heller, E. 1896; Larcher, O. E. 1872a; Leone, N. 1909; Mettenheimer, C. F. 1864; Rzehak, E. C. 1894b; Schaufuss, C. 1902; Slater, P. L. 1858a; Thienemann, W. 1877; Wenig, J. 1930; Zürn, F. A. 1882b. Many species. Angelini, G. 1905; Jäckel, A. J. 1865; Ninni, E. 1920; Stölker, C. 1875.

Alauda. Arrigoni degli Oddi, E. 1889b. *Alauda calandra*. Rossi, Fulvio 1897. *Anas*. Anon. 1834. *Anarhynchus*. Gadow, H. F. 1891a. *Anser*. Gadeau de Kerville, H. 1900. *Broctogerys*. Trouessart, E. L. 1907b. *Campephilus*. Cory, C. B. 1886. *Carduelis elegans*. Rosenberg, C. B. 1887a. *Charadrius*. Gunn, T. E. 1869. *Colaptes*. Law, J. E. 1916. *Columba*. Blanc, H. 1927; Mazzarelli, G. F. 1888; Vogel, G. 1902. *Columba palumbus*. Gunn, T. E. 1869. *Colymbus*. Dionne, C. E. 1903. *Corvus*. Blanc, H. 1927; Doebner, E. P. 1865a; Gadeau de Kerville, H. 1904; Johansen, H. 1893; Schmidt, A. 1901; Sicher, E. &

Arrigoni degli Oddi, E. 1889; Taverner, P. A. 1904a. *Corvus corone*. Heinzel, P. 1861; Laubmann, A. 1910. *Corvus f. frugilegus*. Hermann, O. 1877; Koepert, O. 1896; Laubmann, A. 1909b; Reeker, H. 1907b; Tegetmeier, W. B. 1891; Tobias, L. 1848. *Corvus m. monedula*. Larkin, E. P. 1892. *Dendrocopos*. Kollibay, P. R. 1917. *Fringilla*. Braun, F. 1899d. *Gallinago*. Blake-Knox, H. 1865. *Gallus*. Conte, A. 1910a; Duhamel du Morceau, H. L. 1755; Féré, C. 1895c; Mercier, L. & Poisson, R. 1925b; Racle, —. 1851; Trolldenier, P. 1905. *Garrulus*. Blanc, H. 1927. *Gecin viridis*. Berge, R. 1898; Schneider, G. 1925. *Heteralocha*. Colenso, W. 1887; Kirk, T. W. 1879. *Hippolais*. Stresemann, E. 1928b. *Ligurinus*. Arrigoni degli Oddi, E. 1889b. *Melopsittacus*. Neubert, W. 1866. *Monachus*. Arrigoni degli Oddi, E. 1894c. *Nestor*. Buller, W. L. 1876b. *Numenius arquatus*. Shufeldt, R. W. 1899. *Otocoris alpestris praticola*. Soper, J. D. 1919. *Parus*. Madarász, G. 1902. *Passer*. Bishop, L. B. 1901a; Hantzsch, B. 1902; Hermann, O. 1877; Hibbert-Ware, A. 1918; Madarász, G. 1902; Reeker, H. 1907b; Snyder, W. E. 1905; Walter, A. 1884; Whitaker, J. J. 1872. *Perdix*. Conrad, E. 1901; Schüring, A. & Landois, H. 1895-96. *Perdix cinerea*. Heinzel, P. 1861; Wahlgren, F. 1875. *Phasianus*. Tegetmeier, W. B. 1891. *Pica*. Gesche, P. 1898. *Pica caudata*. Letacq, A. L. 1904. *Picus*. Lemetteil, E. 1868. *Picus viridis*. Besta, R. 1883; Lesmüller, A. 1908. *Podiceps*. Sicher, E. & Arrigoni degli Oddi, E. 1889. *Psittaci*. Schmidt, M. 1866. *Psittacus erithacus*. Owen, R. 1832c. *Ptilocorys cristata*. Ninni, E. 1907. *Pyrgita*. Daut, K. 1908. *Pyrhcorax*. Watson, J. B. 1929a. *Serinus*. Giebel, C. G. 1870; Schultz, E. C. 1780; Vařečka, P. C. 1893. *Sitta*. Bruhin, T. A. 1866. *Sitta cinnamomeiventris*. Martorelli, G. 1917. *Sturnus vulgaris*. Bartsch, S. 1877; Keyl, F. 1928; Landois, H. 1881c; Reeker, H. 1907b; Sicher, E. & Arrigoni degli Oddi, E. 1889; Tegetmeier, W. B. 1897. *Tetrao*. Hermann, O. 1902b. *Turdus cyaneus*. Leone, N. 1908. *Zamelodia [Hedymeles] ludoviciana*. Woodruff, F. M. 1907b.

Excrescence. *Numenius*. Snouckaert van Schauburg, R. C. 1901.

Hare lip. *Anas*. Skriabina, K. 1910.

Health good in spite of abnormality. Liebe, K. T. 1892.

Spur on beak. Wenig, J. 1930.

Cross beak

Crossing of horny sheaths of beak. Normal in *Loxia*.

General. Schuster, W. 1904b. Many species. Stölker, C. 1875. *Anarhynchus frontalis*. Gadow, H. F. 1891a. *Colymbus*. Chernel von Chernelhaza, I. 1901b. *Corvus*. Koepert, O. 1896; Kollibay, P. R. 1917; Moricand, S. 1828; Walter, H. 1864. *Corvus frugilegus* & *C. monedula*. Blackwall, J. 1830. *Cygnus*. Maillefer, A. 1921. *Emberiza*. Moricand, S. 1828. *Gallus*. Hagenbach, E. 1838; Skriabina, K. 1907b. *Gavia* & *Larus*. Chernel von Chernelhaza, I. 1901b. *Loxia*. Blackwall, J. 1830; Blanc, H. 1927; Chernel von Chernelhaza, I. 1901b; Christy, M. 1914b; Gadow, H. F. 1891a; Heinzel, P. 1861; Jäckel, A. J. 1874; Lemmon, W. P. 1897; Mercier, L. & Poisson, R. 1925a. *Melanerpes*. Bowdish, B. S. 1904a. *Otis*. Chernel von Chernelhaza, I. 1901b. *Parus*. Moricand, S. 1828. *Picus*. Blackwall, J. 1830. *Progne*. Jewell, H. W. 1908a. *Pyrrhonorax*. Moricand, S. 1828. *Tetrao*. Chernel von Chernelhaza, I. 1901b. *Totanus*. Durnford, H. 1874. *Turdus*. Banzhaf, W. 1925.

Adaptation of tongue in cross beak. *Gallus*. Mercier, L. & Poisson, R. 1927.

Cause. *Colaptes auratus*. Hunt, C. J. 1904a.

Development. *Gallus*. Raspail, X. 1904a. *Loxia*. *Duerst, U. 1909.

Experimental production. *Gallus*. *Duerst, U. 1909.

Origin not pathologic in *Loxia*. Böker, H. 1922.

Relation to atrophy of eye. *Gallus*. Féré, C. 1895c.

Statistics as to right and left crossing. *Loxia*. Christy, M. 1914b; Ticehurst, C. B. 1910a.

Micrognathia (Abnormal smallness of beak)

General. Includes *Gallus*. Wankel, W. 1925.

Arrested development of beak accompanied by other head anomalies. *Gallus* embryo. Féré, C. 1894c.

EYE

General. *Anser*, *Columba*, & *Gallus*. Larcher, O. E. 1876. *Passer*. Immink, B. 1925. *Strigiformes*. Koenig, E. 1685.

Accessory optic vesicles. *Gallus*. Locy, W. A. 1897.

Inheritance. *Columba*. Wriedt, C. & Christie, W. 1925.

Microphthalmia. *Gallus*. Collins, E. T. & Parsons, J. H. 1903.

Anophthalmia (Anopia and anopsia)

Congenital absence of the eyes.

General. *Columba*. Weissenborn, W. 1839. *Gallus*. Collins, E. T. & Parsons, J. H. 1903; Josephy, H. 1913.

Congenital absence of right eye with contracted orbit. *Corvus*. Witherby, H. F. 1917d.

Coloboma

General. *Passer*. Immink, B. 1925.

Amnion protrusion into lens-vesicle. *Gallus*. Landman, O. 1908a.

Bilateral. Optic nerve papilla. *Gallus*. Szily, A. 1926.

Choroid, iris, and retina. Inversion of lips of optic vesicle cleft. *Gallus*. Landman, O. 1908b.

Ciliary process absent. *Gallus*. Landman, O. 1908b.

Coloboma of the iris. *Athene*. Reisinger, L. 1926a. Includes *Anas*, *Gallus*, & *Passer*. Lindahl, C. 1912.

Malformations of lens. *Gallus*. Landman, O. 1908a.

Suspensory ligament of lens folded. *Anas*, *Anser*, *Gallus*, *Passer*, & *Perdix*. Ritter, K. 1901.

Cyclopia

Single median eye condition.

General. *Columba*. Heine, L. 1905. *Gallus*. Josephy, H. 1913.

Absence of face and brain. *Gallus*. Politzer, G. & Steiner, K. 1926.

Development

General. Includes birds. Huschke, E. 1832b.

Development of brain and eye. *Gallus*. Rabaud, E. 1900b.

Development of eye. *Gallus*. Rabaud, E. 1901c.

OMPHALOCEPHALIA (UMBILICAL HERNIA OF HEAD)

General. *Anas*. Kaestner, S. 1906b.
Gallus. Dareste, C. 1877b, 1891b;
Kaestner, S. 1906a, b.

Development

General. *Gallus*. Rabaud, E. 1907.
Experimental. *Gallus*. Rabaud, E.
1908d; Warynski, S. 1884.

TONGUE

General. *Coturnix*. Bonnet,— &
Charrière, A. L. 1909. *Garrulus*.
Enderes, K. 1878.

Prolapse of tongue. *Gallus*. Finger,
H. 1922.

Limbs

General. *Anas*. Grams, E. 1896.
Gallus. Kondirev, L. V. 1925.

Amelia. (Ectromelia.) Absence of
extremities. *Anas penelope*. Kajava,
Y. 1929. *Gallus*. *Dareste, C. 1863d.

Role of amnion in production of
limb anomalies. Dareste, C. 1882a, e.

Symmelia. Fusion of legs and feet.
Development. Dareste, C. 1868a.

Brachydactylia

Abnormal shortness of fingers or toes.

Correlation with feathering of feet.
(Booting.) *Gallus*. Danforth, C. H.
1919b.

Development of brachydactylia. *Gallus*.
*Danforth, C. H. 1919b; Féré, C. 1895a.

Hereditary brachydactylia. *Gallus*.
Danforth, C. H. 1919a, b, 1929a.

Polymelia

Supernumerary parts present.

Hyperdactylia (Polydactylia)

Extra fingers or toes present.

General. Fisher, G. J. 1888; Jäckel,
A. J. 1874.

Aex galericulata. Seth-Smith, D.
1915a. *Archibuteo lagopus*. Reichenau,
W. 1880. *Buteo*. Beebe, C. W. 1910b;
Hancock, J. L. 1890a. *Buteo latissimus*.

Coale, H. K. 1887. *Charadrius*. Tru-
sheim, F. 1929. *Columba*. Judd, S. D.
1895. *Coturnix*. Finn, F. 1902c.
Gallus. *Anthony, R. L. 1899; An-
thony, R. L. & Salmon, J. 1900; Bar-
furth, D. 1910, 1911a; Bond, C. J.
1920b, 1926; Cramer, M. 1910a;
*Davenport, C. B. 1909c; *Dei, A.
1890; Dunn, L. C. & Jull, M. A. 1927;
Eberhardt,— 1863b; Fougereux de
Bondaroy, A. D. 1778; *Ghigi, A.
1901a, b, c; Hancock, J. L. 1890a;
*Matthiass, K. 1912; Anon. 1877a.
Include *Gallus*. Inhelder, A. 1904;
Prentiss, C. W. 1903. *Larus*. Lunel,
G. 1884; Newman, E. 1869. *Passer*.
Marshall, W. A. 1896. *Phasianus*.
Flower, J. 1879c.

Bones. Houdan fowl. *Gallus*. *Kauf-
mann-Wolf, M. 1908.

Development. *Gallus*. Braus, H.
1908; Féré, C. 1895a; Howes, G. B. &
Hill, J. P. 1892b.

Heredity. *Gallus*. Barfurth, D.
1908a, b, 1909, 1911a, b, c, d, 1914.

Heterodactylia. *Gallus*. Bond, C. J.
1920b, 1926.

Hexadactylia. *Gallus*. Cowper, J.
1889; Langkavel, B. 1886.

Muscles and tendons in hyperdacty-
lia. *Gallus*. Grönberg, G. 1894.
Nine toes present. *Buteo latissimus*.
Coale, H. K. 1887.

Three instead of normal two toes.
Structure. *Struthio*. Hewitt, J. 1913.

Pentadactylia

General. *Gallus*. Martinet, L. 1878.
Dorking fowl. Cowper, J. 1885-86;
*Dei, A. 1890; Ghigi, A. 1917, 1922b;
Howes, G. B. 1893b; Remus, G. 1914.

Muscles and tendons. Houdan fowl.
*Kaufmann-Wolf, M. 1908.

Supernumerary limbs

Book. Text in Latin. *Gallus*.
Aldrovandus, U. 1610-13.

General. Jäckel, A. J. 1874. Many
species. Przibram, H. 1919. *Gallus*.
Fenizia, C. 1902.

Anas. Bullen, G. E. 1910; Chidester,
F. E. 1926; Diard,— 1897, 1905.
Gallus. Chidester, F. E. 1926; Diard,
— 1905; Müller, H. F. 1859; Reiche-
now, A. & Hartwig, W. 1890. *Junco*
hyemalis. Tilton, J. L. 1892. *Larus*.

Gadeau de Kerville, H. 1892; Lidbeck, E. G. 1762. *Perdix*. Schaff, E. A. 1890.

Bones in supernumerary limbs. *Anser*. Wyman, J. 1861.

Synadelphus. Four wings and four feet. *Anas*. Neugebauer, F. L. 1897. *Gallus*. Faber, —. 1852; Hévin, P. 1681; Musy, M. 1912; Neugebauer, F. L. 1897; Rouchy, C. 1879.

Syndactylia

Fusion of two or more fingers or toes.

General. *Delichon urbica*. Monastero, S. 1930. *Gallus*. *Davenport, C. B. 1909c, 1910e; Heckel, E. 1887. Includes *Gallus*. Cramer, M. 1910a.

Hereditary. *Gallus*. Danforth, C. H. 1919a.

Symmetrical. *Gallus*. Féré, C. 1895m.

HIND LIMBS

General. Féré, C. 1895h. *Turdus*. Ninni, E. 1920.

Yolk sac twisted about tibiotarsus. *Gallus*. Lloyd, F. E. 1896.

Supernumerary hind limbs

General. *Coturnix*. Sicher, E. & Arrigoni degli Oddi, E. 1889. *Falco*. Lönnberg, A. J. 1907. *Gallus*. Coues, E. B. 1871a; Dwight, T. 1872.

Double foot. *Anas*. Sicher, E. & Arrigoni degli Oddi, E. 1889.

Third hind limb. Lidbeck, E. G. 1772. *Anser*. Landois, H. 1875. *Planesticus* [*Turdus*] m. *migratorius*. Shufeldt, R. W. 1919c.

Four hind limbs

Anas. Mégnin, P. 1897; Hornung, V. 1905; Neugebauer, F. L. 1897. *Anser*. Polis, G. S. 1686a. *Fringilla*. Canestrini, G. 1870. *Gallus*. Bricon, P. 1884; Canestrini, G. 1870; Hévin, P. 1681; Hoffmann, J. M. 1694; Hornung, V. 1898; Jacquet, M. 1926; Kipping, I. 1876; Landois, H. 1876b; Lichtenstädt, S. 1903; Musy, M. 1912; Neugebauer, F. L. 1897; Ninni, E. 1899; Oka, H. 1926; Pearson, J. 1911; Perrine, C. D. 1915; Rommel, P. 1687b; Schneider, J. T. 1827; Wolff, C. F. 1780. *Meleagris*. Arkhirov, M. 1911. *Passer*. Fabani, C. 1891; Sicher, E. & Arrigoni degli Oddi, E. 1889.

Two limbs on breast. *Gallus*. Landois, H. 1902a.

X-ray pictures. *Gallus* & *Phasianus*. Gadeau de Kerville, H. 1909.

Feet

General. *Anser*. Jäckel, A. J. 1867a. *Coccothraustes*. Camerano, L. 1889.

Abnormally long spurs. *Gallus*. Féré, C. 1900e.

Abnormal epidermis on foot. *Gallus*. Marceau, F. 1900.

Inclusion of foot in abdominal cavity. *Anas*. Reid, E. W. 1889.

Toes

Webless toes. *Anas*. Pires de Lima, J. A. 1926; Schaffner, J. H. 1923; Anon. 1834. *Anser brachyrhynchus*. Low, G. C. 1927.

Zygodactylism (two toes in front and two behind) in non-zygodactylous birds. *Ardea* & *Turtur*. Finn, F. 1891b.

Abnormal claws

General. Many species. Bisogni, C. 1896.

Elongated claw on hind toe. Westberg, P. 1898.

Webbing of toes

General. *Columba*. Bateson, W. 1896; Montagu, E. J. & Tegetmeier, W. B. 1902; Staples-Browne, R. 1905, 1906. *Gallus*. Hill, L. M. 1902.

Incomplete webbing of toes. *Anser*. Jäger, G. F. 1847.

WINGS

Absence of wings. *Gallus*. Terry, J. R. 1919.

Muscles and skeleton. *Gallus*. Kirkham, W. B. & Haggard, H. W. 1915.

Only one wing. *Anas penelope*. Hortling, I. J. 1929a. *Gallus*. Rowley, F. R. 1895.

Spurs on wing. *Dolichonyx*. Coale, H. K. 1887.

Supernumerary wings

General. Bergtold, W. H. 1916a. *Columba*. Böhm, J. 1687.

Four wings present. *Anas*. Neugebauer, F. L. 1897. *Columba*. Giebel, C. G. 1854b. *Gallus*. Broom, R. 1897;

Faber,—. 1852; Hévin, P. 1681; Musy, M. 1912; Neugebauer, F. L. 1897; Rouchy, C. 1879. *Nettion carolinense*. Johnson, C. E. 1915.

Muscles

General. *Gallus*. Racle,—. 1851.

Thigh muscles. *Passer*. Menier, F. 1912.

Nervous system

General. *Gallus*. Racle,—. 1851.

Dorsal root ganglia. *Gallus*. Onodi, A. D. 1885.

BRAIN

General. *Columba*. Mazzarelli, G. F. 1888. *Gallus*. Dzerzhinski, V. 1915.

Abnormal development. *Gallus*. Lunghetti, B. 1914.

Encephalocele. Protrusion of cerebral hemisphere into orbit. *Columba*. Heine, L. 1905.

Hypophysis. Double infundibulum. *Gallus*. Collin, R. 1926b.

Pseudencephalia. Brain replaced by vascular tumor. *Gallus*. Lunghetti, B. 1911b.

Anencephalia

Absence of brain.

General. *Gallus*. Josephy, H. 1913; Lunghetti, B. 1911b; Saint-Remy, G. C. 1897.

Development. *Gallus*. Dareste, C. 1867a.

Origin. Includes *Gallus*. Lebedeff, A. 1881.

Plumage

See also under **Coloration, Feathers, and Plumage**.

General. Holland, T. 1864.

Anser. Francus de Frankenu, G. F. 1727b; Giseler, L. 1671. *Chauna*. Simmermacher, G. 1884. *Columba*. Luck, V. 1856. *Gallus*. Riddle, O. 1908a. *Haliaeetus*. Blasius, W. 1889. *Miliaria calandra*. Angelini, G. 1915. *Streptopelia*. Riddle, O. 1908a. *Struthio*. Pycraft, W. P. 1907b; Smith, F. C. 1921. *Sturnus*. Alzani, F. 1913a. *Tichodroma*. Girtanner, G. A. 1888.

Bifurcation of feather. Rutherford, W. J. 1902-03.

Double feathers. *Columba*. Blanchard, R. A. 1890. *Gallus*. Parona, C. 1906. *Psittacus*. Mützel, G. 1888.

Downlessness. *Gallus*. Serebrovsky, A. S. & Petroff, S. G. 1929.

Fault bars in feathers. Many species. *Riddle, O. 1908b. *Cardinalis* & *Gallus*. Riddle, O. 1907. *Streptopelia*. Strong, R. M. 1902a.

Frizzled feathers. *Gallus*. Landauer, W. 1930a.

Silky and woolly feathers. *Gallus*. Taubert, F. 1910.

Spiny feathers. *Gallus*. Aldrovandus, U. 1610-13, 2, 308; Cole, L. J. & Hawkins, L. E. 1930.

Upside-down feathers. *Phasianus*. Murie, J. 1865.

ABSENCE OF FEATHERS

General. *Gallus*. Chapman, R. H. 1909; Hecht, E. 1901; Landois, H. 1886a.

Breast region. *Gallus*. Conte, A. 1909.

Neck region. *Gallus*. Conte, A. 1909; Davenport, C. B. 1914a, b; Freund, L. 1925.

TAIL FEATHERS

General. *Acanthis c. cannabina*. Sunkel, W. 1924.

Rectrices

General. *Columba*. Blanchard, R. A. 1890.

Bending outward of feathers. *Pica*. Csató, J. V. 1901.

Double shaft. *Columba*. Landois, H. 1894d.

Doubling of middle rectrices. *Paradisidae*. Bierens de Haan, J. A. 1920.

Elongation. *Anas*. Poncy, R. 1910.

Stunted rectrices. *Serinus*. Giebel, C. G. 1870.

Skeleton

General. Larcher, O. E. 1875a. *Gallus* & *Larus*. Graiño Caubet, C. 1905.

Exencephalia. Monster with imperfect cranium and brain on outside of skull. *Gallus*. *Dareste, C. 1863d;

Richter, W. 1887b; Wassjutotschkin, A. 1913b.

Hyperencephalia. Brain exposed because of defective cranium. *Gallus*. Dareste, C. 1860a, c.

Ribs. *Alca*, *Clivicola*, *Cypselus*, *Galeoscoptes*, *Melanoptila*, *Quiscalus*, *Sturnella*, & *Trochilus*. Lucas, F. A. 1888a.

STERNUM

General. *Gallus*. Hamilton, E. 1875; Lucas, F. A. 1900a. *Syrnium aluco*. Tegetmeier, W. B. 1877b.

Cavity in sternum through which intestine passed. *Meleagris*. Jackson, J. B. 1875.

Keel absent. *Gallus*. Dunn, L. C. 1924f.

VERTEBRAL COLUMN

General. *Gallus*. Racle,—. 1851.

Rumpless fowls. Castelló Carreras, S. 1921. *Gallus*. Dunn, L. C. 1925b, 1926a; Dunn, L. C. & Landauer, W. 1924; Landauer, W. 1928; Landauer, W. & Dunn, L. C. 1925.

Spina bifida

General. *Anas*. Kollmann, J. K. 1893. *Gallus*. Kollmann, J. K. 1893; Peebles, F. 1898; Richter, W. 1887b, 1888.

Anatomy and etiology. *Gallus*. Richter, W. 1889.

Development. Dareste, C. 1869e.

Origin. Includes *Gallus* & *Sturnus*. Holmdahl, D. E. 1925a. Includes *Gallus*. Lebedeff, A. 1881.

Umbilical hernia (Omphalocele)

Development. *Gallus*. Rabaud, E. 1898, 1900a.

Blood vessels. *Gallus*. Rabaud, E. 1897.

Urogenital system

Congenital absence of kidney. Includes *Aex galericulata*. Scott, H. H. 1925. *Gallus*. Roberts, E., Card, L. E., & Boyden, E. A. 1929.

Hypertrophy of left kidney with disappearance of right. *Gallus*. Sutton, J. B. 1885b.

GENITALIA

General. Millet-Horsin,—. 1918. Absence of gonads. Larcher, O. E. 1917.

Extra pair of small testes. *Corvus*. Skriabina, K. 1908c.

Hen with two ovaries. *Gallus*. Atwood, H. & Snyder, H. 1922.

Persistence of embryonic genital papilla. *Gallus*. Roberts, E., Card, L. E., & Boyden, E. A. 1929.

Rudimentary right testis in female chick. Benoit, Jacques 1924e.

Oviduct

General. *Anas*. Lefeuvre,—. 1906.

Distal orifice separate from cloaca. *Gallus*. Mégnin, J. P. 1896.

Distention of oviduct. *Gallus*. Domm, L. V. 1932.

Diverticulum. *Gallus*. Tongu, K. & Koyano, K. 1913.

Rudimentary right oviduct. *Gallus*. Skriabina, K. 1908d.

Shell gland and vagina absent. Effects. *Gallus*. Curtis, M. R. 1915c.

Two oviducts. *Gallus*. Andres, J. 1928.

Uropygeal gland

Absence of uropygeal gland. Rumpless fowl. *Gallus*. Landauer, W. & Dunn, L. C. 1925.

Long, coiled sebaceous projection from uropygeal gland. *Vanellus*. Ticehurst, C. B. 1910b.

Vascular anomalies

General. Includes *Columba*. Smallwood, W. M. 1906.

Arteries of the wing. *Ciconia alba*. Alessandrini, A. 1842.

Carotid arteries. *Pitta*. Bernstein, H. A. 1859a.

HEART

General. Larcher, O. E. 1874a. *Gallus*. Dareste, C. 1876b.

Cardiocephalia. *Gallus*. *Tur, J. 1922.

Seven hearts. *Gallus*. Verocay,—. 1905, 1906.

Misplacement

General. *Dendrocygna*. Bannerman, W. B. 1906.

Embedded in pectoral muscles. *Querquedula*. Waterston, D. 1906.

Visceral anomalies

General. *Columba*. Mazzarelli, G. F. 1888. *Gallus*. Jaquet, M. 1924.

Celosomia. Hernial protrusion of embryonic viscera. *Dareste, C. 1863d.

ALIMENTARY CANAL

General. *Gallus*. Jaquet, M. 1926.

Dilation of esophagus. *Columba*. Anon. 1733e.

Gizzard. *Gallus*. Hérisant, F. D. 1757b; Sangalli, G. 1896.

Intestinal anomalies

General. *Anas*. Schultz, S. 1673-74.

Displacement of intestine. *Gallus*. Hérisant, F. D. 1757b.

Supernumerary ceca. *Anas* & *Gallus*. Gadeau de Kerville, H. 1894.

SITUS INVERSUS VISCERUM

Books. Text in French. Dareste, C. 1891b.

Text in German. Baer, K. E. 1828b; Keibel, F. & Abraham, K. 1900.

General. Bremer, J. L. 1924, 1925; Féré, C. 1900b; Warynski, S. & Fol, H. 1884.

TESTES

See also under **Reproduction** and **Urogenital system**.

Books. Text in Dutch. Testes incidental. Leeuwenhoek, A. 1686.

Text in German. *Gallus*. Müller, J. P. 1830b.

Text in Latin. *Gallus*. Fabricius ab Aquapendente, H. 1688.

General. *Cuculus*. Smith, J. A. 1858b. Hybrid. *Cairina moschata* × *Anas boschas*. Poll, H. 1906.

Arginase content. *Gallus*. Chaudhuri, A. C. 1928b.

Degeneration. *Gallus*. Portier, P. & Rorthays, R. 1921.

Deposition of fat in testes. *Gallus*. Pearl, R. & Boring, A. M. 1912.

Hybridization. Effects. *Carduelis* × *Serinus*, *Phasianus*, & *Streptopelia*. Stephan, P. 1903d.

DEVELOPMENT

Book. Text in Danish. Schmiegelow, E. 1882b.

General. *Fringilla*. Etzold, F. 1891. *Gallus*. Schmiegelow, E. 1882a; Semon, R. W. 1887; Sernoff, D. 1874. Includes *Gallus*. Lockwood, C. B. 1887.

Germinal epithelium. *Gallus*. Lau-lanié, B. P. 1886a, b.

Hybrids. Degree of development. Anatidae. Stephan, P. 1908.

HISTOLOGY

General. Anatidae. Schöneberg, K. 1913. Includes *Anser*. Stieve, H. 1927a. *Gallus*. Benoit, Jacques 1923b, 1929a. Includes *Gallus*. Lereboullet, A. 1851.

Tubuli recti. *Passer*. Alverdes, K. 1924.

Interstitial tissue

General. Many species. Blanchard, R. A. 1916; Goodale, H. D. 1924c. Includes birds. Barnabo, V. 1906; Benoit, Jacques 1923e. Birds incidental. Stieve, H. 1920.

Anas. Pellegrini, G. 1925b. Includes *Anas*. Popoff, N. 1909. *Anser*. Lipschütz, A. 1923. Includes *Columba* & *Corvus*. Popoff, N. 1909. *Gallus*. Nonidez, J. F. 1924a; Pearl, R. & Boring, A. M. 1912; Pézard, A. 1923b. Includes *Gallus* & *Passer*. Popoff, N. 1909. *Phasianus*. Pézard, A. 1923b.

No true interstitial tissue and no internal secretion from interstitial tissue. *Gallus*. *Boring, A. M. 1912.

INTERSTITIAL CELLS

General. *Anser* & *Colaeus monedula collaris*. Stieve, H. 1921. *Columba*. Pellegrini, G. 1925. *Corvus*. Orban, F. 1928. *Gallus*. Benoit, Jacques 1923d, 1929b; Boring, A. M. & Pearl, R. 1917; Pellegrini, G. 1925b; Ramírez, E. 1928; Reeves, T. B. 1915. *Passer*. Pellegrini, G. 1925b.

Breeding and market-fattened geese. *Anser*. Stieve, H. 1921.

Chemical nature of lipoidal material. *Gallus*. Benoit, J. & Wenslaw, A. 1929.

Cytological changes in breeding season. Benoit, Jacques 1923d.

Cytology. *Corvus*. Orban, F. 1928.

Development of interstitial cells. Orban, F. 1929. *Fringilla*. Mazza, F. 1924. *Gallus*. Benoit, Jacques 1923b, c, g, 1927e, 1929b; Loisel, G. 1904d. *Passer* & *Sturnus*. Mazza, F. 1924.

PHYSIOLOGY OF INTERSTITIAL TISSUE

Castration (incomplete). Effects. *Gallus*. Benoit, Jacques 1926a, b, d.

Domestication. *Anser* & *Gallus*. *Stieve, H. 1926.

Function. Includes birds. Barnabo, V. 1906. *Gallus*. Benoit, Jacques 1929b; Loisel, G. 1904d.

Relation to migration. Experimental. Rowan, W. 1929.

SEASONAL CHANGES IN INTERSTITIAL TISSUE

General. Benoit, Jacques 1922.

Measurements of variation in amounts of interstitial tissue and other tissue in breeding season. Benoit, Jacques 1923f.

Modification of interstitial tissue of testes at breeding period. *Anas* & *Passer*. Pellegrini, G. 1925a.

Secondary sex characters. Effects on. *Gallus*. Ouy-Vernazobres, —. 1922.

Luteal cells

Absence. *Phalaropus*. Morgan, T. H. 1923.

Relation to hen-feathering. *Gallus*. Goodale, H. D. & Nonidez, J. F. 1924.

Seminiferous tubules

General. Many species. Gulliver, G. 1842b. *Gallus*. Huber, G. C. 1916a, c; Pézard, A., Sand, K., & Caridroit, F. 1924b.

Development. *Gallus*. Sernoff, D. 1874.

Homology with medullary cords of ovary. *Gallus*. Nonidez, J. F. 1929.

Seminal epithelium. Cytology. Orban, F. 1928.

SERTOLI CELLS

General. *Passer*. Loisel, G. 1901c.

Modifications in hybrids. *Phasianus*, *Serinus*, & *Streptopelia*. Stephan, P. 1906a.

PHYSIOLOGY OF TESTES, INCLUDING EXPERIMENTAL STUDIES

Ablation of thymus. Effects on testes. Soli, U. 1907.

Anterior lobe of hypophysis, extract (beef). Feeding effects. *Anas*. Schockaert, J. A. 1931a.

Castration. Effects on secondary sex characters. *Gallus*. Foges, A. 1898, 1903.

Effects of testes upon the liver. *Gallus*. Pézard, A. 1913b.

Hypertrophy of testis after removal of other testis. Measurements. *Gallus*. Benoit, Jacques 1925; Domm, L. V. & Juhn, M. 1927.

Inanition. Effects. Martino, G. 1927. *Columba*. Marrian, G. F. & Parkes, A. S. 1928.

Influence on metabolism. Szuman, J. G. 1926b.

Modification in size and activity. *Sturnus*. *Bissonnette, T. H. 1930a, 1931a, b, 1932.

Morphogenic action. *Gallus*. Pézard, A. 1921a.

Ovariectomized fowl. Testis-like gonads developed. Benoit, Jacques 1926b, d, e; *Domm, L. V. 1931a.

Periodic fatty secretions. *Passer*. Loisel, G. 1903a.

Periodicity in activity. *Anas crecca*, *Columba palumbus*, *Emberiza*, *Fringilla*, *Passer*, & *Sturnus*. Loisel, G. 1900f.

Relation in activity to bursa Fabricii. *Gallus*. Jolly, J. 1913a.

Seasonal variations in testes. *Sturnus*. Bissonnette, T. H. 1930b. Review of literature. Includes *Anser*, *Colinus*, & *Fringilla*. Oslund, R. 1928.

Secretion of semen. *Passer*. Regaud, C. 1902a, b.

Spontaneous development. Histology. *Gallus*. Benoit, Jacques 1923b.

Testis and ovary grafts on chorio-allantoic membrane. Effects on embryo. *Gallus*. Minoura, T. 1921.

Artificial light experiments

Acceleration in hypertrophy in winter. *Erithacus rubecula*. Putzig, P. 1937.

Sexual cycle changes. *Sturnus*. *Bissonnette, T. H. 1930a, 1931a, b, 1932.

Endocrine (Internal secretion) effects on

Development of secondary sex characters. *Gallus* & *Phasianus*. Pézard, A. 1911b.

Glycogen production in liver. *Gallus*. Pézard, A. 1911a.

EFFECTS OF EXTRACT OF TESTES

On comb. *Gallus*. Smith, A. J. & Crocker, W. J. 1913.

Injections. *Gallus*. Smith, G. 1906.

Ligation of

Vas deferens. *Gallus*. Nonidez, J. F. 1924b.

Testes of hen-feathered males. *Gallus*. Morgan, T. H. 1920b.

Transplantation of testis

General. *Gallus*. Berthold, A. A. 1849.

Effects on secondary sex characters. *Gallus*. Foges, A. 1898, 1903.

PIGMENTED TESTES

General. *Gallus*. Bittner, H. 1925c.

Difference in pigmentation of right and left. *Cypselus*. Solger, B. F. 1886.

QUANTITATIVE STUDIES OF TESTES

Relations of seminiferous and interstitial tissue to whole organ, quantitatively. Includes birds. Benoit, Jacques 1923e.

Sexually ripe. Measurements. *Gallus*. Freund, L. 1909. Includes birds. Benoit, Jacques 1923e.

Size and length, relations. *Columba*. Riddle, O. 1916b.

Volume. Montlezun, A. 1900.

Asymmetry in size or number

Asymmetrical development during breeding season. Many species. Wagner, R. 1837.

Bilateral asymmetry of *Gallus*. Mimura, H. 1928.

Inequality of right and left. *Cypselus*. Solger, B. F. 1886.

No correlation with sex ratio. *Friedmann, H. 1927c.

Relative size and form of right and left testes in hybrids. *Columbidae*. Riddle, O. 1918c.

SINGLE TESTIS

General. *Centropus*. Bernstein, H. A. 1860a, b.

Testis on right side only. Explanation of occurrence. *Columbae*. Riddle, O. 1924c.

SEASONAL CHANGES IN TESTES

See also under Interstitial tissue.

Correlation with plumage changes. *Anatidae*. Parhon, C. J. & Parhon, C. 1922b.

Development. *Gallus*. Grynfeldt, E. & Pech,—. 1922.

IN SIZE AND ACTIVITY

General. Many species. Wagner, R. 1837. *Sturnus*. Bissonnette, T. H. & Chapnick, M. H. 1930.

Hyperplasia. *Anas*. Mencl, E. 1907.

Hypertrophy. Relation to migrations. *Rowan, W. 1925c, 1926b, 1927a.

Microscopic study. *Ligurinus*. Watson, A. 1919.

Seasonal regression. Histologic study. *Sturnus*. *Bissonnette, T. H. 1930b.

THYMUS GLAND

See also under Endocrinology.

Book. Text in German. Many species. Gadow, H. F. 1891d.

General. Jolly, J. 1913c.

Includes *Columba*. Cuénot, L. 1889. *Gallus*. Greenwood, A. W. 1930; Jolly, J. 1913a, 1914a; Stieda, C. H. 1880. Includes *Passer*. Cuénot, L. 1889.

Changes in weight with age. *Meleagris*. Latimer, H. B. & Rosenbaum, J. A. 1926.

DEVELOPMENT

General. Birds incidental. His, W. 1889.

Anas. Hamilton, B. 1913. *Gallus*. *Mall, F. P. 1887; Verdun, P. 1898a, b. Include *Gallus*. Bemmelen, J. F. 1886a; Fischelis, P. 1885b; Hammar, J. A. 1905; Meuron, P. 1886a; Strauss, O. 1915. *Passer*. Helgsson, C. 1913. Includes *Passer*. Bemmelen, J. F. 1886a. *Podilymbus*. Johnson, C. E. 1908, 1918a. *Rhea*. Bemmelen, J. F. 1886b. Includes *Serinus*. Bemmelen, J. F. 1886a. *Vanellus cristatus*. Sicher, L. 1921.

Histogenesis. *Gallus*. Wassjutotschkin, A. 1913a.

Homologies. Retterer, E. & Retterer, A. 1913.

Thymic (Hassall's) corpuscles. Includes birds. Jolly, J. & Levin, S. 1912.

HISTOLOGY

General. Includes birds. Dantschakoff, W. 1916a.

Columba, *Gallus*, & *Turtur*. Salkind, J. 1912.

Senility. Effects. *Gallus*. Terni, T. 1927b.

Small cortical cells believed to be lymphoid. Includes birds. *Dantschakoff, W. 1916a.

Striated cells. *Anas*, *Gallus*, & *Phasianus*. Weissenberg, R. 1907.

INVOLUTION

General. Birds incidental. Hammar, J. A. 1905. *Anas*, *Columba*, & *Gallus*. Jolly, J. & Levin, S. 1911a, b.

Persistence in adults. No evidence of marked degeneration at sexual maturity. Lewis, T. 1905.

Relation to involution of gonads. *Gallus*. Greenwood, A. W. 1930.

Sex comparison. *Columba* & *Streptopelia*. *Riddle, O. & Frey, P. 1925.

PHYSIOLOGY

General. Stefko, V. G. 1915. Includes *Gallus*. Soli, U. 1909.

Ameboid movements of lymphocytes. Jolly, J. 1914a.

Effect of parasitism on thymus gland. Ackert, J. E. 1924.

Function in ovulation. *Columba* & *Streptopelia*. *Riddle, O. 1924d. In formation of egg envelopes. Columbidae. Riddle, O. 1923b.

Influence on calcium metabolism. *Gallus*. Soli, U. 1910-11.

Experimental studies

Hypophysis (anterior lobe) feeding effects on thymus gland. *Anas*. Schockaert, J. A. 1930, 1931a.

Production of thymovitin indispensable to production of egg envelopes. *Columba* & *Gallus*. Riddle, O. 1924d.

Simultaneous administration of pituitary and thymus gland extracts to growing chicks. *Gallus*. Maxwell, S. S. 1916.

ANTAGONISM OF THYMUS AND THYROID GLANDS

Effects on weight of adult. *Columba*. Kříženecký, J. 1928a, b, d.

Effects on feather development. *Columba*. Kříženecký, J. 1928c.

EFFECTS OF CASTRATION

General. Includes *Gallus*. *Soli, U. 1907, 1909.

Histology. *Gallus*. Terni, T. 1927b.

RELATIONS OF THYMUS TO

Adrenals, hypophysis, and thyroid glands. Includes *Gallus*. Soli, U. 1909.

Thyroid gland in effect on body weight. *Columba*. Kříženecký, J. 1928b.

EFFECTS OF THYMECTOMY

General. *Gallus*. Basch, K. 1908; Fischl, R. 1907; Morgan, A. H. & Grierson, M. C. 1929. Growing hens. Ackert, J. E. & Morris, M. H. 1929.

On testes. *Gallus*. Soli, U. 1907.

EFFECTS OF THYMUS FEEDING ON

Bone growth. *Gallus*. Katsura, H. 1922.

Feather development. Nevalonnyj, M. 1927b. *Columba*. Kříženecký, J. 1927b; Kříženecký, J. and others 1927. *Gallus*. Kříženecký, J. 1926a; Kříž-

ženecký, J. & Nevalonnyj, M. 1927;
Kříženecký, J. & Podhradský, J. 1927.

Pigmentation of feather. *Gallus*.
Kříženecký, J. & Podhradský, J. 1927.

THYROID GLAND

See also under **Endocrinology**.

Books. Text in English. Includes birds. Hoskins, R. G. 1922.

Text in German. Many species. Gadow, H. F. 1891d.

General. Many species. Jolly, J. 1909b; Pettit, A. 1898. Includes birds. Lambotte, H. 1870. Birds incidental. Vincent, S. 1910.

Include *Columba*. Cuénot, L. 1889; Thompson, F. D. 1910. Includes *Gallus*. Thompson, F. D. 1910. Includes *Passer*. Cuénot, L. 1889. Psittaci. Berthold, A. A. 1825. Includes *Sylvia*. Thompson, F. D. 1910.

Race differences in thyroid gland. *Corvus*. Haecker, V. 1926b.

ANATOMY

General. Many species. Pettit, A. 1898. Includes birds. Forsyth, D. 1908. Includes *Columba*. Wölfler, A. 1880. *Gallus*. Fritsch, E. 1926.

DEVELOPMENT

Includes *Columba*. Wölfler, A. 1880. *Fringilla* [*Serinus*]. Stellwaag, F. 1912. *Gallus*. Gray, H. 1852; *Mall, F. P. 1887; Müller, W. 1871b; Seessel, A. 1877; Verdun, F. 1898a, b; Yoshikawa, T. 1930. Include *Gallus*. Bemmelen, J. F. 1886a; Fischelis, P. 1885b; Meuron, P. 1886a. Includes *Passer*. Bemmelen, J. F. 1886a. *Rhea*. Bemmelen, J. F. 1886b. Includes *Serinus*. Bemmelen, J. F. 1886a. *Vanellus cristatus*. Sicher, L. 1921.

HISTOLOGY

General. *Gallus*. Fritsch, E. 1926.

Collagenous fibers. *Columba*. Livini, F. 1909b.

Comparison for birds of high and low altitudes. Haecker, V. 1926a.

Cyclic variations. *Küchler, W. 1935.

PHYSIOLOGY

General. Many species. Florentin, P. & Weis, M. 1930.

Climatic effects. *Corvus*. Haecker, V. 1926b.

Iodine content. Correlation with age and sex. *Gallus*. Chaudhuri, A. C. 1928a.

Seasonal changes. Columbidae. Riddle, O. 1925e. *Corvus*. Bergtold, W. H. 1926b; Haecker, V. 1926b.

Experimental studies

Grafting embryonic thyroid gland. *Gallus*. *Willier, B. H. 1923, 1924.

ENDOCRINE ACTION OF OTHER ORGANS COMPARED WITH ACTION OF THYROID GLAND

Antagonistic action of ovary. *Gallus*. Horning, B. & Torrey, H. B. 1927.

Antagonistic effect of thyroid and ovary on melanin pigment formation in feather. *Gallus*. Torrey, H. B. & Horning, B. 1925b.

Comparison of effects on feather development of feeding ovary and thyroid tissue. *Anas*. Parhon, C. J. & Parhon, C. 1923.

Antagonism of thymus gland

Effect on body weight. *Columba*. Kříženecký, J. 1928a, b, d.

Effects on feather development. *Columba*. Kříženecký, J. 1928c.

FEEDING OR INJECTION OF THYROID GLAND TISSUE OR EXTRACT

Usually involves hyperthyroidism.

General. Zawadowsky, B. M. & Rochlin, M. 1927. *Anas*. Parhon, C. J. & Parhon, C. 1914. Includes *Anas*, *Columba*, & *Gallus*. Carlson, A. J., Rooks, J. R., & McKie, J. F. 1912. *Columba*. Zawadowsky, B. M. 1926. *Gallus*. Cole, L. J. & Hutt, F. B. 1927-28; Giacomini, E. 1923, 1924; Giacomini, G. 1926; Parhon, C. J. & Parhon, C. 1914; Zawadowsky, B. M. 1925, 1926. *Passer*. Occhipinti, G. 1926, 1927a. *Pavo*. Zawadowsky, B. M. 1926. Phasianidae. Occhipinti, G. 1927a. *Serinus*. Occhipinti, G. 1926, 1927a.

Effects of excessive doses on body temperature. *Gallus*. Martin, J. H. 1929a.

Egg production. *Gallus*. Crew, F. A. & Huxley, J. S. 1923.

Fate of thyroxin in blood and tissues. *Gallus*. Zawadowsky, B. M. & Perlmutter, Z. M. 1927.

Fixation of thyroid gland hormone in gonads. Asimoff, G. 1927.

Gonads. *Gallus*. Torrey, H. B. & Horning, B. 1922; Zawadowsky, B. M. 1926.

Growth rate. *Gallus*. Crew, F. A. & Huxley, J. S. 1923; *Lillie, F. R. & Juhn, M. 1932; Reggiani, E. 1925.

Hen-feathering induced in male fowl by feeding thyroid. *Gallus*. Torrey, H. B. & Horning, B. 1922.

Influence on metabolism. *Columba*. Sierens, A. & Noyons, A. K. 1926. *Gallus*. Hutt, F. B. 1930b.

Minimal dose. *Gallus*. Zawadowsky, B. M. & Bessmertnaja, S. I. 1927.

Neuropathologic effects. *Gallus*. Zawadowsky, B. M. 1925.

Poisoning from excessive doses. *Gallus*. Zawadowsky, B. M. 1925.

Polydipsia and polyphagia. *Gallus*. Zawadowsky, B. M. 1925.

Polynuritis. *Columba*. Seaman, E. C. 1920.

Precocious ossification from ox thyroid extract. *Columba* & *Gallus*. Blasi, D. 1925.

Rejuvenation of aged fowl by thyroid feeding. *Gallus*. Crew, F. A. 1925c.

Resistance to infection. *Gallus*. Parhon, C. J. & Parhon, C. 1914.

PLUMAGE, EFFECTS ON

General. Nevalonnyj, M. 1927b.

Anas. Parhon, C. J. & Parhon, C. 1923. *Botaurus*, *Bubo*, & *Buteo*. *Bralis, A. 1930. *Columba*. Zawadowsky, B. M. 1926. *Coturnix*. Occhipinti, G. 1927b. *Gallus*. Benazzi, M. 1929; Brambell, F. W. 1926; Champy, C. & Morita, J. 1928; Cole, L. J. & Reid, D. H. 1924; Crew, F. A. & Huxley, J. S. 1923; Greenwood, A. W. & Blyth, J. S. 1929; Hutt, F. B. 1930b; Zawadowsky, B. M.

1926, 1927. Includes *Gallus*. Sainton, P. & Peynet, J. 1926. *Pavo*. Zawadowsky, B. M. 1926. *Phasianus*. Zawadowsky, B. M. 1929. *Syrnium*. *Bralis, A. 1930.

Form of feathers. *Gallus*. Horning, B. & Torrey, H. B. 1923; Schwarz, E. 1931; Torrey, H. B. & Horning, B. 1925a.

Structure of feathers. *Gallus*. Zawadowsky, B. M. & Rochlin, M. 1928.

Change of color of feathers

General. *Columba*. Blasi, D. 1925. *Gallus*. Blasi, D. 1925; Giacomini, G. 1926; Horning, B. & Torrey, H. B. 1923. *Pyrrhula*. Schereschewsky, H. 1929.

Blanching. *Gallus*. Sainton, P. & Simonnet, H. 1929.

Color pattern effects. *Columba*. *Lillie, F. R. & Juhn, M. 1932; Martin, J. H. 1929a; Torrey, H. B. 1926; Zawadowsky, B. M. 1925, 1926. *Pavo*. Zawadowsky, B. M. 1926.

Effects on feather development

General. *Columba*. Kříženecký, J. 1927b; Kříženecký, J. and others 1927; Zawadowsky, B. M. 1926. *Gallus*. Benazzi, M. 1929; Giacomini, G. 1926; Kříženecký, J. 1926a; Kříženecký, J. & Nevalonnyj, M. 1927; Kříženecký, J. & Podhradský, J. 1927; Kuhn, O. 1928a; *Lillie, F. R. & Juhn, M. 1932; Podhradský, J. 1926; Schwarz, E. 1931; Torrey, H. B. & Horning, B. 1925a; Zawadowsky, B. M. 1926; Zawadowsky, B. M. & Rochlin, M. 1928.

Antagonism of thymus. *Columba*. Kříženecký, J. 1928c.

Melanin formation. *Columba*. Zawadowsky, B. M. 1926. *Gallus*. Horning, B. & Torrey, H. B. 1923, 1927; Zawadowsky, B. M. 1926; Zawadowsky, B. M. & Rochlin, M. 1928. *Pavo*. Zawadowsky, B. M. 1926. *Pyrrhula*. Schereschewsky, H. 1929.

Effects on molt

General. *Gallus*. Cole, L. J. & Hutt, F. B. 1927-28; Horning, B. & Torrey, H. B. 1923; Kuhn, O. 1929; Torrey, H. B. & Horning, B. 1925a.

Antagonism of thymus. *Columba*. Kříženecký, J. 1928c.

Precocious molt. Induced by ox thyroid extract. *Columba* & *Gallus*. Blasi, D. 1925; Zawadowsky, B. M. 1925, 1926.

Effects on pigmentation of feathers

General. *Gallus*. Hutt, F. B. 1930b; Kříženecký, J. & Podhradský, J. 1927; Podhradský, J. 1926; Schwarz, E. 1931.

Depigmentation. *Columba* & *Pavo*. Zawadowsky, B. M. 1926. *Gallus*. Hutt, F. B. 1930b; Zawadowsky, B. M. 1925, 1926.

SEX DEVELOPMENT

General. *Phasianus*. Zawadowsky, M. M. 1929.

Hen-feathering in male associated with pathology of thyroid gland. *Gallus*. Buchanan, G. 1926.

Intersexuality caused by hyperthyroidism. *Gallus*. Nevalonny, M. 1927a.

Secondary sex characters. *Gallus*. Cole, L. J. & Hutt, F. B. 1927-28; Ouy-Vernazobres, —. 1922; Torrey, H. B. & Horning, B. 1925c.

Size of thyroid gland

Larger in autumn and winter. *Corvus*. Bergtold, W. H. 1926b.

Reciprocal size change in relation to ovulation rate. Columbidae. Riddle, O. 1925e.

EFFECTS ON THYROID GLAND OF FEEDING PITUITARY GLAND (HYPOPHYSIS) ANTERIOR LOBE

General. *Anas*. Schockaert, J. A. 1930, 1931a.

Effect on iodine content. *Anas*. Schockaert, J. A. & Foster, G. L. 1932.

Hypertrophy and hyperplasia. *Anas*. Schockaert, J. A. 1932.

Thyroidectomy, effects

General. Includes *Gallus*. Moussu, G. 1897.

Development of plumage retarded. *Anas* & *Anser*. Parhon, C. J. & Parhon, C. 1924.

Female chick deprived of thyroid gland given doses of desiccated thyroid gland, resulting in hyperthyroidism. *Gallus*. Kříženecký, J. 1927a.

Hen-feathering effect. Crew, F. A. 1927a.

Male plumage replaces female plumage. *Gallus*. Greenwood, A. W. & Blyth, J. S. 1927.

TISSUE CULTURE

Microscopic study of living tissues, usually embryonic. See also under Grafts.

Book. Text in English. Strange-way, T. S. 1924.

General. *Gallus*. Bergami, G. 1925; Burrows, M. T. 1910a, b, 1911, 1913; Carrel, A. & Burrows, M. T. 1910; Lewis, M. A. & Lewis, W. H. 1915; Lewis, W. H. & Lewis, M. A. 1912a; Murao, K. 1925; Thomson, D. 1914a, b. Include *Gallus*. Hadda, S. 1912; Rous, F. P. & Jones, F. S. 1916.

Artificial rejuvenescence. *Gallus*. Carrel, A. 1911.

Calcification. Relation to lipid metabolism. *Gallus*. *Hanes, F. M. 1912.

Cholesterol formation. Spleen. *Gallus*. Roffo, A. H. 1928.

Cinematograph records of growth and movements of cells. *Gallus*. Comandon, J., Levaditi, C., & Muter-milch, S. 1913.

Cytotoxic action of immune rabbit serum. *Gallus*. Kimura, R. 1927.

Dark-field studies. *Gallus*. Lewis, W. H. 1923c.

Developing bone treated with thyroid gland extract. *Gallus*. Katsura, H. 1922.

Duration of life after incubation is interrupted. *Gallus*. Bucciante, L. 1929.

Effects of electrolytes on embryo fragments. *Gallus*. Olivo, O. 1922.

Egg albumen as medium. *Gallus*. Swezy, O. 1915.

Ether, effects of, on cells. *Gallus*. Cash, J. R. 1919.

Foreign plasma as medium. Includes *Columba* & *Gallus*. Lambert, R. A. & Hanes, F. M. 1913.

Identification of tissues. *Gallus*. Congdon, E. D. 1915.

Low temperature. Fibroblasts and chicken sarcoma. Includes *Gallus*. Fischer, A. 1926.

Membrane formation. *Gallus*. Lewis, M. A. & Lewis, W. H. 1912.

Reactions of embryonic cells to solid objects. Stereotropism. *Gallus*. Harrison, R. G. 1914.

Sea water, diluted, isotonic for plasma. *Gallus*. Lewis, M. A. 1916.

Spontaneous rhythmical contractions of muscles of bronchial tubes and air sacs. *Gallus*. Lewis, M. A. 1924.

Toxicity of α -amino-acids for embryonic chicken cells. Burrows, M. T. & Neymann, C. A. 1917.

CELL TYPES AND CYTOLOGY

General. Includes *Columba* & *Gallus*. Dove plasma as medium. Lambert, R. A. & Hanes, F. M. 1913; *Lewis, M. A. & Lewis, W. H. 1915.

Cartilage cells. *Gallus*. Strangeways, T. S. 1923.

Gland cells. *Gallus*. Champy, C. 1912.

Cell division

General. *Gallus*. Levi, G. 1922a.

Amitosis. *Gallus*. Macklin, C. C. 1916a, b.

Vital stained cells. Embryo. *Gallus*. Levaditi, C. & Gabrek, F. 1914.

MITOSIS

Comparison of active mitosis and its arrest. *Gallus*. Levi, G. 1922a.

Found to be quite normal. Hance, R. T. 1926b.

Fibroblasts

General. Weiss, P. 1929. Degenerating granules and vacuoles. Lewis, W. H. 1919.

Granule formation. Embryo. *Gallus*. Lewis, M. A. 1921; Prigosen, R. E. 1921.

Various cells and cell structures

Embryonic cells. Movements. *Gallus*. Osowski, H. 1914.

Giant cells. Development as result of introduction of foreign bodies. *Gallus*. Lambert, R. A. 1912a.

Liver cells. *Gallus*. Lynch, R. J. 1921.

Macrophages. Spleen. *Gallus*. Rioch, D. M. 1923.

Mitochondria. *Gallus*. *Lewis, M. A. & Lewis, W. H. 1914, 1915.

Myofibrillae of cardiac muscle. *Gallus*. Levi, G. 1922b; Olivo, O. 1924a.

Pure cultures of cells. *Gallus*. Carrel, A. 1912.

Spermatozoa. Transformation into nucleus. *Gallus*. Loeb, J. & Bancroft, F. W. 1912.

Susceptibility of cells to vital stains. *Gallus*. Levaditi, C. & Gabrek, F. 1914.

Vacuole formation. Embryo. *Gallus*. Prigosen, R. E. 1921.

GROWTH

Action of mechanical tension on direction and intensity of tissue growth. *Gallus*. *Weiss, P. 1929.

Artificial activation. *Gallus*. Carrel, A. 1913a.

Artificial media. Embryo. *Gallus*. Lewis, M. A. & Lewis, W. H. 1911.

Bone growth. Effects of thymus gland extract. *Gallus*. Katsura, H. 1922.

Fibroblasts. *Gallus*. *Weiss, P. 1928.

Growth of connective tissue. *Gallus*. *Carrel, A. 1913b, 1914.

Heart and spleen tissue. Comandon, J., Levaditi, C., & Mutermilch, S. 1913.

Heart tissue growth in duck embryo juice but not in chick juice. *Anas* & *Gallus*. Kaufman, L. 1926a.

Limb buds. *Gallus*. Strangeways, T. S. & Fell, H. B. 1926.

Negative acceleration. *Gallus*. Cohn, A. E. & Murray, H. A. 1925.

Rate of growth of heart culture in embryonic juice of *Anas* & *Gallus* compared. Kaufman, L. 1926a.

Spleen. Dilution of medium. *Gallus*. Carrel, A. & Burrows, M. T. 1911.

Variation in growth

Character of growth. *Gallus*. Lambert, R. A. 1912b.

Osmotic tension and dilution of culture media. Effect on cell proliferation and connective tissue. Ebeling, A. H. 1914.

HEMAPOIESIS

General. *Gallus*. *Foot, N. C. 1913; Sabin, F. R. 1917b, 1920, 1921.

Erythropoiesis. *Gallus*. Shipley, P. G. 1916.

ORGANS AND PARTS OF BODY

Kidney development. *Gallus*. *Rienhoff, W. F. 1922.

Pancreas. *Gallus*. Pinkus, H. 1930.

Bone marrow

General. *Gallus*. Erdmann, R. 1916-17, 1917.

Bearing on hemapoiesis. *Gallus*. Foot, N. C. 1913.

Origin of fat tissue. *Gallus*. Foot, N. C. 1912b.

Reaction of bone marrow to immune plasma. *Gallus*. Foot, N. C. 1912a.

Eye

General. *Gallus*. Strangeways, T. S. & Fell, H. B. 1926.

Chorioid layer. *Gallus*. Strangeways, T. S. 1923.

Vascular system

General. *Gallus*. Clark, E. R. 1914, 1915.

Blood vessels in fragments of embryo. *Gallus*. Reagan, F. P. 1915b.

HEART

General. *Columba*. Olivo, O. 1926. *Gallus*. Bucciante, L. 1927; Grigorieff, L. M. 1929; Levaditi, C. & Mutermilch, S. 1913; Olivo, O. 1924c, 1925a, b, 1926; Rumianzew, A. 1922.

Action of calcium and potassium salts on contraction rate. *Gallus*. Olivo, O. 1924b.

Cellular anastomoses of two heart fragments and synchronous pulsation. *Gallus*. Fischer, A. 1924b.

Influence of hypo- and hypertonic solutions on fibroblasts of embryonic heart. *Gallus*. Hogue, M. J. 1919.

Initiation of contraction wave chronicity. *Columba* & *Gallus*. Olivo, O. 1926.

Myogenic origin of contraction impulse. *Gallus*. Burrows, M. T. 1912.

Proliferation of cells. *Gallus*. Levaditi, C. & Gabrek, F. 1914.

Temperature effect on rhythm. *Gallus*. Lewis, W. H. 1924.

TISSUES

Amniotic ectoderm. *Gallus*. Lewis, W. H. 1923a.

Cardiac muscle. *Gallus*. Levi, G. 1922b, 1923; Olivo, O. 1925b; Rumianzew, A. 1922, 1927; Shipley, P. G. 1916.

Connective tissue. *Gallus*. Ebeling, A. H. 1913, 1914; Prigosen, R. E. 1921; Thomson, D. 1914b.

Endothelium. Embryonic liver. *Gallus*. Lewis, W. H. 1922b.

Epithelium. Differentiation and keratinization. Champy, C. 1912; Fischer, A. 1924a.

Germinal epithelium. *Gallus* embryo. Fano, G. & Garofolini, L. 1927.

Mesenchyme from different organs. Morphological differences. *Gallus*. Faz-zari, J. 1924.

Mesothelium and mesenchyme. *Gallus*. Lewis, W. H. 1923b.

Pigment epithelium of eye. *Gallus*. Smith, D. T. 1920.

Nervous tissue

Autonomic nervous system of embryonic intestine. *Gallus*. Lewis, W. H. & Lewis, M. A. 1912b.

Brain, spinal cord, and nerve fibers. *Gallus*. Thomson, D. 1914b.

Degeneration and regeneration of axis cylinders. Includes *Gallus*. Ingebrigtzen, R. 1913.

Development. *Gallus*. Burrows, M. T. 1910b, 1911; Levi, G. 1916, 1925.

Spinal cord tissue. Its relation to other tissues in culture. *Gallus*. Grigorieff, L. M. 1929.

Pathologic tissue

Chick embryo tissue containing avian tubercle bacilli. *Gallus*. Smith, D. T., Willis, H. S., & Lewis, M. A. 1922.

Chicken sarcoma. *Gallus*. Fischer, A. 1925a, b, 1926.

Result of mixing embryonic tissue with transplantable tumor. *Anas*, *Columba*, & *Gallus*. Mukoyama, T. & Yagi, K. 1923.

UROGENITAL (URINO-GENITAL) SYSTEM

Including the excretory and reproductive organs. See also under *Cloaca*, *Embryology*, *Ovary*, *Reproduction*, and *Testes*.

Text in English. Owen, R. 1866-68.

Text in German. Kollmann, J. K. 1882; Mayer, A. F. 1842b. Many species. Gadow, H. F. 1891d. *Gallus*. Spoof, A. R. 1883. Includes *Gallus*. Meckel von Hemsbach, J. H. 1848.

General. Birds incidental. Semon, R. W. 1892.

Aeronautes & *Bubo*. Marshall, M. E. 1907. *Casuarus*. *Geoffroy St. Hilaire, E. 1822a. Includes *Gallus*. Balfour, F. M. 1876b. *Geococcyx*. Marshall, M. E. 1907. *Phalaenoptilus*. Marshall, M. E. 1906. *Struthio*. *Geoffroy St. Hilaire, E. 1822a.

ANATOMY

General. Birds incidental. Fürbringer, M. 1878.

Histology. *Columba*. Janošik, J. 1885. *Gallus*. Janošik, J. 1885; Pézard, A. 1922b.

DEVELOPMENT

Book. Text in German. Spoof, A. R. 1883.

General. Many species. *Hoffmann, C. K. 1892. Birds incidental. Fürbringer, M. 1878. Includes *Anas*. Mihálikovics, G. V. 1885-86. *Columba*. Janošik, J. 1885. *Gallus*. Bornhaupt, K. F. 1867; Gasser, E. 1879a; Janošik, J. 1885; Nussbaum, E. 1903. Include *Gallus*. Balfour, F. M. 1876b; Mihálikovics, G. V. 1885-86.

REPRODUCTIVE (GENITAL) SYSTEM

Books. Text in English. *Lagopus scoticus*. Wilson, E. A. 1911c.

Text in French. Geoffroy St. Hilaire, E. 1822c.

Text in German. Includes *Columba* & *Gallus*. Waldeyer-Hartz, W. 1870.

Text in Latin. *Anas* & *Fringilla*. Spangenberg, G. 1813. *Gallus*. Morgagni, J. B. 1723; Spangenberg, G. 1813.

General. Geoffroy St. Hilaire, E. 1822b, d, 1823a. Many species. Osawa, G. 1911.

Includes *Columba*. *Martin Saint-Ange, G. J. 1856. Include *Gallus*. Lereboullet, A. 1847; *Martin Saint-Ange, G. J. 1856. *Phasianus*. Yarrell, W. 1831c. Includes *Tetraonidae*. Olsen, O. 1913. Hybrids. *Fringilla* × *Passer chloris* & *Pyrrhula* × *Fringilla*. Stephan, P. 1903a.

Copulatory organs. Many species. Forbes, W. A. 1877; Gerhardt, U. 1909. Includes birds. Boas, J. E. 1891. *Anas*, *Anser*, *Craz*, *Cygnus*, & *Tinamus*. Gerhardt, U. 1908. *Apteryx*. Gerhardt, U. 1907.

Development of reproductive organs

Books. Text in German. Müller, J. P. 1830a. Includes *Columba* & *Gallus*. Waldeyer-Hartz, W. 1870.

General. *Gallus*. Janošik, J. 1890. Includes *Gallus*. Rathke, M. H. 1825a.

Gonads

General. Birds incidental. Born, G. 1894-95. *Gallus*. Geoffroy St. Hilaire, E. 1822f; Pézard, A. 1922b.

Absence or reduction. *Columbidae*. *Riddle, O. 1925a.

Activity in hybrids. *Carduelis* × *Serinus*. Chappellier, A. 1911c.

Asymmetry in size and weight. Birds incidental. Disselhorst, R. 1898.

Body-weight loss during hypertrophy. Stieve, H. 1922b.

Chemical properties of secretions. *Gallus*. Loisel, G. 1904a.

Extirpation of gonads (castration), also thyroid gland and hypophysis. Putzig, P. 1935.

Influence of gonads on secondary sex characters. van Oordt, G. J. 1931.

Post-embryonic condition of right gonad in female. Kummerlöwe, H. 1931b.

Structure of right gonad in female. Kummerlöwe, H. 1930a, b.

DEVELOPMENT

General. *Gallus*. *Firket, J. 1914; Semon, R. W. 1887; Thomsen, E. 1911. Includes *Gallus*. Wehefritz, E. & Gierhake, E. 1930.

Degree of development in hybrids. *Carduelis* × *Serinus*. *Phasianus* × *Gallus*. Stephan, P. 1906b.

Grafted into allantois. *Gallus*. *Corinaldesi, F. 1927a, b.

Histogenesis. *Gallus*. Nonidez, J. F. 1920a, 1922.

Maturing. Masi, A. 1922.

Origin and function in embryo. *Anas*, *Gallus*, & *Passer*. Loisel, G. 1903b.

EFFECTS OF ENVIRONMENT INCLUDING BODY

General. Includes *Anser*. Stieve, H. 1927a.

EXPERIMENTAL STUDIES OF EFFECTS OF LIGHT

General. *Gallus*. *Stieve, H. 1926.

Stimulation with electric light. Rowan, W. 1928, 1929, 1930, 1932. Book. Text in English. Rowan, W. 1931.

HISTOLOGY

General. *Gallus*. Fell, H. B. 1923; Kohn, A. 1921.

Hybrids. Anatidae & Fringillidae. *Poll, H. & Tiefensee, W. 1907.

In summer. *Arenaria interpres* & *Calidris canutus*. van Oordt, G. J. 1928.

Interstitial tissue

General. Benoit, Jacques 1922. Includes birds. Bouin, P. & Ancel, P. 1924. *Gallus*. Benoit, Jacques 1926d; Goodale,

H. D. 1919d; Nonidez, J. F. 1920a, 1922. *Gennaeus nyctemerus*. Freud, J. S., Jongh, E., & Laqueur, E. 1930.

Development. *Gallus*. Firket, J. 1914.

Function. Freud, J. S., Jongh, E., & Laqueur, E. 1930.

Luteal cells

General. Many species. Goodale, H. D. 1924c; Yocom, H. B. & Philipps, B. I. 1923, 1924. *Phalaropus*. Yocom, H. B. 1923.

Occurrence in testes of hen-feathered male. *Gallus*. Buchanan, G. 1926.

SEASONAL CHANGES

General. Benoit, Jacques 1922. *Agelaius p. phoeniceus*. Allen, A. A. 1914b. Columbidae. Riddle, O. 1925e. *Passer*. Witschi, E. 1935.

Condition of gonads in summer. *Arenaria interpres* & *Calidris canutus*. van Oordt, G. J. 1928.

Increase in volume and weight at mating time. *Fringilla* & *Passer*. Disselhorst, R. 1908.

Female reproductive organs

General. Includes birds. Jörg, J. C. 1815. *Columba* & *Corvus*. Eckert, H. 1861. Falconidae. Kollmann, M. 1919. *Gallus* & *Passer*. Eckert, H. 1861.

Anatomy. *Anas*, *Fringilla*, & *Gallus*. Book. Text in Latin. Spangenberg, G. 1813.

External female genitalia. *Casuaris [Dromiceius] novae-hollandiae*. Mayer, A. F. 1842a.

Figures. *Gallus*. Anon. 1884a.

OVIDUCT

General. *Apteryx*. Owen, R. 1849. *Carbo* & *Crotophaga*. Nathusius, W. 1884. *Gallinula*. Hering, E. 1864. *Gallus*. *Geoffroy St. Hilaire, E. 1823b; Maynard, C. J. 1896a; Nathusius, W. 1884, 1885a; Schenckling-Prévôt, C. 1898a. *Pelecanus* & *Sula*. Nathusius, W. 1884.

Atrophy in resting period. *Gallus*. Buckner, G. D. & Martin, J. H. 1925a.

Development of oviduct. *Gallus*. *Borsenkow, J. 1869, 1872.

Uterus. Histology. *Gallus*. Froböse, H. 1928.

Anatomy of oviduct

Ligaments. Structure and development. *Gallus*. Curtis, M. R. 1910.

Seasonal variation. *Colaeus*. Stieve, H. 1922a.

Development. Mullerian ducts

General. *Lunghetti, B. 1909a, b.

Development. *Anas*. *Burger, H. 1894. *Gallus*. Balfour, F. M. & Sedgwick, A. 1879; Gasser, E. 1872, 1874; Sernoff, D. 1874. *Tadorna*. Burger, H. 1891, 1894.

Effect of insufficient separation of thoracic and abdominal cavities on rostral portion of Müllerian duct. *Psittacus*. Argaud, R. 1922.

Vestiges. Pedunculated hydatid. *Melopsittacus undulatus*. Argaud, R. 1922.

Histology

General. Includes birds. Sacchi, M. 1887b.

Includes *Anas*. Giacomini, M. 1893b. Includes *Asio* & *Chelidon*. Sacchi, M. 1887a. *Columba*. *Hankó, B. 1910. Includes *Columba*. Giacomini, E. 1893b. Includes *Corvus*. Giersberg, H. 1922. *Gallus*. Bradley, O. C. 1928; Cushny, A. R. 1902; Surface, F. M. 1912; Turchini, J. 1924. Include *Gallus*. Giacomini, E. 1893b; Giersberg, H. 1922; Sacchi, M. 1887a. Include *Meleagris*. Giacomini, E. 1893b; Sacchi, M. 1887a. Includes *Numida*, *Serinus*, & *Strix*. Sacchi, M. 1887a. Includes *Turtur*. Giacomini, E. 1893b.

Distribution of elastic tissue. Includes birds. Pandolfini, R. & Ragnotti, G. 1900.

Innervation. *Gallus*. Johnson, J. S. 1925.

Oviducal glands. Includes *Anas*, *Corvus*, & *Gallus*. Loos, P. A. 1881. *Gallus*. Cushny, A. R. 1902.

Pathologic conditions in oviduct

Book. Text in German. Durski, S. P. 1907.

General. Panum, P. L. 1863.

Obstruction of oviduct. *Gallus*. Weber, —. 1883.

Rupture of oviduct. *Gallus*. Martin, J. H. & Anderson, W. S. 1919.

Persistence of right oviduct

General. Many species. Picchi, C. 1911b; Wagner, R. 1837. *Accipiter nisus*. Ogilvie, F. M. & Jourdain, F. C. 1910; Stieve, H. 1924b; Ticehurst, C. B. 1910c. *Columba*. Kummerlöwe, H. 1930b. *Falco palumbarius*. Stieve, H. 1924a, b. *Passer*. Kummerlöwe, H. 1930b.

Rudimentary right oviduct. *Gallus*. Skriabina, K. 1908d.

Physiology of oviduct

General. Giersberg, H. 1921; Panum, P. L. 1863; Taschenberg, E. O. 1885, 1894. Includes birds. Purkinje, J. E. & Valentin, G. G. 1835b. *Gallus*. Buckner, G. D. & Martin, J. H. 1925a; *Pearl, R. 1909; Purkinje, J. E. & Valentin, G. G. 1835a; Stieda, C. H. 1902; Turchini, J. 1924.

Atrophy following ovariectomy. Benoit, Jacques 1926d.

Effect of injections of female sex hormones. *Gallus*. Juhn, M., d'Amour, F. E., & Gustavson, R. G. 1930.

End to end anastomosis of oviduct without loss of function. *Gallus*. Pearl, R. & Surface, F. M. 1908b.

Male reproductive organs

General. Include birds. Fleischmann, A. 1902a, b.

Accentor. Fatio, V. 1864. *Anas*. Tannenberg, G. G. 1810; Vicq d'Azyr, F. 1791a. *Gallus*. Tannenberg, G. G. 1789, 1810. *Passer*. Tannenberg, G. G. 1810. *Struthio*. Beautiful plates. Müller, J. P. 1836.

Anatomy, gross and microscopic. *Anas*, *Anser*, & *Gallus*. Trawinski, A. 1910.

EXTERNAL GENITALIA

General. Many species. Albrecht, P. C. 1886b.

Figures. *Gallus*. Graaf, R. 1663. *Palaeognathae*. *Müller, J. P. 1836.

Copulatory organs

General. Ghigi, A. 1923c. Includes birds. Gerhardt, U. 1909. *Anas*. Gerhardt, U. 1908, 1914; *Liebe, W. 1914; Trawinski, A. 1911. Anatidae. Boas, J. E. 1891. *Anser*. Gerhardt, U. 1908, 1914. *Bubalornis*. Sushkin, P. P. 1927. *Cairina* & *Cereopsis*. Gerhardt, U. 1914. *Crax*. Gerhardt, U. 1908. *Cygnus*. Gerhardt, U. 1908; Trawinski, A. 1911. *Dromaeus*. Boas, J. E. 1891. *Leptoptilus*. Gadow, H. F. 1887. Ratitae [Palaeognathae]. Gadow, H. F. 1887; Gerhardt, U. 1914. *Rhea* & *Struthio*. Boas, J. E. 1891. *Tinamus*. Gerhardt, U. 1908.

Phallus (Penis)

General. *Anas*. Hashimoto, D. 1931a, b. *Cygnus*. Trawinski, A. 1911. *Penelope*. Tschudi, J. J. 1843. *Textor niger*. Sharpe, R. B. 1902c.

Absence. *Cereopsis*. Dareste, C. 1862e. *Gallus*. Dove, W. F. 1928.

Development. *Anas*. Hashimoto, D. 1931a; Pomayer, C. 1902. *Anser*. Pomayer, C. 1902. *Columba*. Hashimoto, D. 1931a. *Gallus*. Hashimoto, D. 1930, 1931a.

Homologies. *Struthio*. Retterer, E. & Neuville, H. 1914.

Penis-like appendage. Alleged unusual use. *Textor niger*. Hartert, E. J. 1902, 1917b.

Phylogeny. Birds incidental. Poirier, P. 1886.

Small size in sterility. *Gallus*. Dove, W. F. 1928.

Well-developed penis present. *Tinamus*. Gerhardt, U. 1908.

Erectile tissue

See also under **Head**.

General. *Anas* & *Gallus*. Legros, C. 1868.

Physiology of erection of penis. *Anas* & *Anser*. Eckhard, C. 1876.

Regression of erectile organs after post-puberty castration. *Gallus*. Pézard, A. 1917.

Structure. *Anas* & *Anser*. Pomayer, C. 1902. *Struthio*. Retterer, E. & Neuville, H. 1914.

INTERNAL GENITALIA

Arginase content. *Gallus*. Chaudhuri, A. C. 1928b.

Ductuli efferentes. *Gallus*. Benoit, Jacques 1926g. *Passer*. *Alverdes, K. 1924.

Histology. Figures. *Gallus*. Benoit, Jacques 1926g. *Passer*. Alverdes, K. 1924.

Seminal vesicles. Cyclical growth. Effect of hormones. Riddle, O. 1927a.

Vas deferens. Ligation did not produce rejuvenation. Crew, F. A. 1925e.

Epididymis

General. Includes *Passer*. Alverdes, K. 1928.

Development. Include *Gallus*. Schmiegelow, E. 1882a, b.

Histology and physiology

General. *Passer*. *Alverdes, K. 1924.

Epithelium. *Gallus*. Steffen, H. 1921.

URINARY ORGANS

General. Includes *Columba*. Meisenheimer, J. 1913.

Comparative anatomy. Includes *Gallus*. Fürbringer, M. 1878.

Development

General. *Acanthis c. cannabina* & *Anser*. Siemerling, E. 1882. *Gallus*. Rückert, J. 1893; Siemerling, E. 1882. Include *Gallus*. Fürbringer, M. 1878; Kerens, B. 1907.

Transitory rudimentary excretory organs third to fourth day of incubation. Arise as caudal diverticuli of the celom. *Anas*, *Gallus*, & *Numida*. Weber, A. 1903e.

Kidneys

Books. Text in English. Includes birds. Davy, J. 1839.

Text in German. Möllendorff, W. 5, 1927-30. Many species. Gadow, H. F. 1891d.

General. Ferrein, A. 1753b; Gadow, H. F. 1879; Galvani, L. 1767.

Accipiter cooperi. Fitzpatrick, F. L. 1930. *Anser*. Peyer, J. C. 1683.

Columba & *Gallus*. Curious figures. Lindgren, H. O. 1868. *Garrulus*. Müller, J. P. 1830b.

Arginase content. *Gallus*. Chaudhuri, A. C. 1928b.

Blood flow. Quantity. *Gallus*. Gibbs, O. S. 1927, 1928.

Fusion. Many species. Wagner, R. 1837.

ANATOMY

General. Emmert, A. G. 1811. Include birds. Ferrein, A. 1753b; Martin Saint-Ange, G. J. 1830. Includes *Gallus*. Burnett, W. I. 1854.

VEINS

See also under Circulatory system.

General. Good figures. Many species. Hasebroek, K. 1917.

So-called renal portal veins. Gratiolet, P. 1853; Jacobson, L. L. 1817. Many species. *Das, B. K. 1924; *Jourdain, S. 1859; Spanner, R. 1924. *Anas*. Das, B. K. 1931. *Struthio*. Gratiolet, P. 1856.

DEVELOPMENT

General. *Anas*. Janošik, J. 1907. *Gallus*. Kupffer, C. W. 1866; *Rienhoff, W. F. 1922. Include *Gallus*. Burnett, W. I. 1854, 1856; Janošik, J. 1905, 1907; Renson, G. 1883a; Thayssen, A. 1873. *Gallus* incidental. Weber, S. 1897.

Development in embryo grafts. *Gallus*. Hoadley, L. 1926a.

Renal corpuscles. Includes *Gallus*. Möllendorff, W. 1911.

Pronephros

General. *Gallus*. Balfour, F. M. & Sedgwick, A. 1878, 1879; *Felix, W. 1890-91. Includes *Gallus*. Renson, G. 1883b.

Development. Includes birds. Brook, G. 1888. *Gallus*. *Felix, W. 1890; Hoadley, L. 1926a. *Vanellus cristatus*. *Rabl, H. 1908.

Glomerulus. Development. *Gallus*. Sedgwick, A. 1880b.

Pronephric duct. Includes birds. Brook, G. 1888.

Relation to Müllerian duct. Includes *Gallus*. Kocks, J. 1891.

Mesonephros

Book. Text in English. Banks, W. M. 1864.

General. Follin, E. 1850; Janošik, J. 1905. Includes birds. Coste, J. J. 1839. *Gallus*. Sedgwick, A. 1880a, c. Include *Gallus*. Coste, J. J. 1839; Haycraft, J. B. 1894; Hoadley, L. 1926a; Renson, G. 1883b; Weber, S. 1897.

Function of mesonephros. *Anas*, *Gallus*, & *Passer*. Loisel, G. 1902d.

Meso- and metanephros. Includes *Gallus*. Janošik, J. 1905.

Development

General. *Anas*. Burger, H. 1894. Include *Gallus*. Haycraft, J. B. 1894; Sedgwick, A. 1882. *Tadorna*. Burger, H. 1894.

Development of mesonephros and gonads transplanted to allantois in tissue culture. *Gallus*. Corinaldesi, F. 1926.

Differentiation in graft. *Gallus*. Willier, B. H. 1930.

Parovarium. (Epoöphoron.) Vestigial mesonephros. *Gallus*. Benoit, Jacques 1926b; Brandt, A. F. 1889b.

Mesonephric duct

General. *Anser*. Gasser, E. 1877a; Glaser, E. 1878. Falconidae. Kollmann, M. 1919. *Gallus*. Gasser, E. 1875, 1877a; Glaser, E. 1878; Kowalensky, —. 1875; Laulanié, B. P. 1883.

Caudal extremity. *Anas* & *Anser*. Weber, A. 1903b.

Experimental obstruction. Boyden, E. A. 1927.

Development

General. *Anser*. Glaser, E. 1878. *Gallus*. Dansky, J. & Kostenitsch, J. 1880; Gasser, E. 1875; Glaser, E. 1878; Kowalensky, —. 1875; Laulanié, B. P. 1883; Romiti, G. 1873a, 1874; Sedgwick, A. 1882.

Early development. *Anser* & *Gallus*. Gasser, E. 1877a.

Persistence in females of mesonephric duct. Many species. Chappellier, A. 1910, 1911b, 1914.

HISTOLOGY

Book. Text in German. Includes birds. Möllendorff, W. 1927-30. Bd. 7, pp. 225-234.

General. Chang, Y. T. 1923. *Columba*. Policard, A. & Lacassagne, A. 1910. Includes *Columba*. Edwards, J. G. & Schmitter, C. 1933. *Gallus*. Likhatscheff, A. 1896.

Epithelium. (Cuticle.) *Euplectes [Ploceus] franciscanus*. Tchang, L. K. 1923.

Uriniferous tubules

General. Includes *Buteo* & *Columba*. Hüfner, C. G. 1866. *Gallus*. *Feldotto, A. 1929; Huber, G. C. 1916b.

Renal corpuscles. *Anser*, *Columba*, *Corvus*, *Gallus*, *Phasianus*, & *Psittacus*. Standfuss, R. 1907.

Vestigial and provisional uriniferous tubules. Warner, F. J. 1927.

PHYSIOLOGY

General. Bial, M. 1890. Includes birds. Davy, J. 1839. *Columba*. Policard, A. & Lacassagne, A. 1910. *Gallus*. Mayrs, E. B. 1924; Wittich, W. 1856.

Hypertrophy when ureter of opposite kidney was ligatured. *Gallus*. Likhatscheff, A. 1896.

Experimental feeding

Carnivorous diet, effects. *Gallus*. Houssay, F. 1901a.

Influence on weight. Magnan, A. 1912o, q.

Urine secretion

General. *Gallus*. Errico, G. 1907; *Sharpe, N. C. 1912.

Chemical and physical properties of urine. *Anas* & *Gallus*. *Szalágyi, K. & Kriwuscha, A. 1914.

Early stages in development of kidneys. *Gallus*. Bakounine, S. 1895.

Effect of innervation by N. vagus. Includes birds. Couvreur, E. 1892a.

Uric acid secretion and excretion

General. Cazeneuve, P. 1881. Includes birds. Harley, G. 1890. *Gallus*. Gibbs, O. S. 1929a, b.

Effects of drugs. *Gallus*. Gibbs, O. S. 1929a.

Influence of rate of urine flow. Includes *Gallus*. Robertson, J. H. 1914.

Ureters

General. Galvani, L. 1767. Includes *Gallus*. Disselhorst, R. 1894.

Development. *Gallus*. Renson, G. 1883a.

Histology. *Gallus*. Feldotto, A. 1929.

VARIATION

A limited number of publications dealing with variation in birds are listed here. See also under Quantitative works.

Books. Text in English. Include birds. Darwin, C. R. 1868; Morgan, T. H. 1903; Wallace, A. R. 1880. Includes *Gallus*. Hagedoorn, A. L. & Hagedoorn, A. C. 1921.

Text in French. *Anas*. Rogeron, G. 1903.

Text in German. Hansemann, D. P. 1909.

General. Aplin, O. V. 1892a; Cipolla, F. 1896; Finn, F. 1902c, 1908; Tristram, H. B. 1893. Many species. Gloger, C. W. 1829a; Mearns, E. A. 1878; Montgomery, T. H. 1896b. Include birds. Allen, J. A. 1892; Fischer, J. 1874.

Acridotheres. Inglis, C. M. 1900. *Alca*. Shitkow, B. M. 1907. *Alectoris*. Bateson, W. & Bateson, G. 1925. *Anas*. Finn, F. 1913. *Anser fabalis*. Lönnberg, A. J. 1903b. *Astragalinus*. Dwight, J. 1902a. *Buarremon*. Chapman, F. M. 1923. *Buteo*. Fischer, C. 1899; Fischer, E. 1908. *Cairina moschata*. Finn, F. 1913. *Carduelis*. Finn, F. 1903. *Carpodacus*. Bergtold, W. H. 1914. *Chordeiles*. Oberholser, H. C. 1914. *Columba*. Bonizzi, P. 1873; Louart, F. 1919. *Columba* incidental. Grabham, M. 1896. *Corvus*. Aplin, O. V. 1911; Shitkow, B. M. 1907. *Coturnix*. Chigi, F. 1905. *Dromedea*. Loomis, L. M. 1918, 1919b. *Dryobates villosus*. Jenkins, H. O. 1906. *Egretta*. Bailey, A. M. 1928c. *Elainea*. Allen, J. A. 1890. *Eudypitula*. Alexander, W. B. & Nicholls, B. 1918. *Falco*. Bernstein, H. A. 1859b. *Fratricula*. Shitkow, B. M. 1907. *Gallus*. Ball, S. C. 1933; Finn, F. 1902h; Tegetmeier, W. B. 1901. Includes *Gallus*. Hagedoorn, A. L. & Hagedoorn, A. C. 1914. *Garrulus*. Landois, H. 1903a. *Geothlypis*. Palmer, W. 1900. *Hydrobatidae*. Loomis, L. M. 1918. *Junco*. Dwight, J. 1918. *Lanius*.

Miller, A. H. 1931; Strong, R. M. 1901. *Larus*. Dwight, J. 1917. *Lophophanes*. Madarász, G. 1884. *Melanitta*. Miller, W. D. 1926. *Miliaria*. Auerbach, A. 1906. *Munia flaviprymna*. Seth-Smith, D. 1907a. *Muscicapa*. Madarász, G. 1884. *Oidemia*. Miller, W. D. 1926. *Ostinops decumanus*. Chapman, F. M. 1920. *Passer*. Stresemann, E. 1913. *Passerella iliaca*. Linsdale, J. M. 1928c. *Pelecanoididae*. Loomis, L. M. 1918. *Phasianus*. Finn, F. 1905b. *Saxicola*. Angelini, G. 1898. *Serinus*. Fassbender, J. 1905. *Sitta homeyeri*. Lönnberg, A. J. 1929d. *Stercorarius* & *Syrhaptes*. Shitkow, B. M. 1907. *Sturnus*. Aplin, O. V. 1911. *Tetrao urogallus*. Lönnberg, A. J. 1906b. *Turdus*. Cannarella, P. 1907; Hänish, R. 1893. *Uria*. Shitkow, B. M. 1907.

Abrupt variation. *Charadriiformes* & *Galliformes*. Finn, F. 1902e.

Embryonic variation. *Gallus*. Mehnert, E. 1896a.

Fecundity variation. *Gallus*. Pearl, R. & Surface, F. M. 1909b.

Individual variation in a collection. Anfrie, E. 1917.

Mendelian variation. In nature. Gill, E. L. 1922.

Migration as check. North America. Montgomery, T. H. 1896a.

Modes of variation. India. Many species. Blyth, E. 1851.

Progressive variation. *Polyplectrum* [*Polyplectron*]. Finn, F. 1902g.

Relation to development. Many species. Montgomery, T. H. 1896b.

Size. Clark, H. L. 1893b. *Pyrenestes*. Chapin, J. P. 1924b.

ANATOMIC VARIATIONS IN VARIOUS ORGANS

General. *Gallus*. Souba, A. J. 1923. Aorta. Includes birds. Broman, I. 1907.

Comb. *Gallus*. Pearl, R. 1911e; *Pearl, R. & Pearl, M. D. 1909.

Nerves. Caudal spinal. *Columba*. Peck, J. I. 1889a, b.

Spinal cord. *Columba*. Peck, J. I. 1889b.

Limbs

General. Includes *Anser* & *Gallus*. Alpatov, W. W. & Boschko-Stepanenko, A. M. 1928.

FEET

General. Many species. Forbes, W. A. 1882m.

Arrangement and number of tarsal scutes. *Haliaeetus leucocephalus*. Gilpin, J. B. 1873.

Long claw on rear toe. Westberg, P. 1898.

Plumage

General. *Struthio*. Pycraft, W. P. 1907b.

Long tail. *Anas*. Poncy, R. 1910.

Number of appendages to feathers. *Ampelis garrulus*. Anon. 1835a.

ABSENCE OF FEATHERS

General. *Gallus*. Hecht, E. 1901.

Neck and breast. *Gallus*. Conte, A. 1909.

STRUCTURE OF FEATHERS

General. *Columba*, *Gallus*, *Meleagris*, *Perdix*, & *Phasianus*. Gragert, R. 1925. *Miliaria calandra*. Angelini, G. 1915.

Aftershaft. Taxonomic value. Miller, W. D. 1924b.

Skeletal variations

General. Many species. Shufeldt, R. W. 1887d. Includes birds. Lucas, F. A. 1893c. Birds incidental. Shufeldt, R. W. 1887k. *Gallus*. Schneider, M. & Dunn, L. C. 1924. *Passer*. *Bumpus, H. C. 1899.

Development. *Gallus* & *Struthio*. Mehnert, E. 1897.

Skull. *Meleagris*. Shufeldt, R. W. 1887l. *Strigiformes*. Kleinschmidt, O. 1901, 1902.

Vertebrae. *Columba*. Peck, J. I. 1889b.

RIBS

General. Many species. Lucas, F. A. 1888a, 1889a. Tenth rib. *Spheniscus*. Duerden, J. E. & FitzSimons, V. 1922.

Visceral variations

General. Gloger, C. W. 1856a.

In development of ventral pancreatic anlage. *Anas*. Weber, A. 1903f.

INTESTINE

Coils. Many species. Mitchell, P. C. 1896b, 1901c.

Extent of mucosa. Crampe, H. 1872.

Length. *Columba*. Bloch, A. 1904.

COLOR VARIATION

General. Many species. Gengler, J. 1906a; Tschusi zu Schmidhoffen, V. 1867. Hybrids. Blaauw, F. E. 1907a.

Columbae. Van Dyck, W. T. 1896. *Melopsittacus*. Marsden, J. W. 1922.

Beak color. Anatidae. Bonhote, J. L. 1903c.

Color markings of tongue. Young birds. Many species. Ingram, C. 1907b.

Iris color. *Parus*. Anzinger, F. 1897.

Plumage

General. Altum, B. 1867a; Bonjour, S. 1888; Gurney, J. H. Jr. 1889c; Layard, E. L. 1869; Newton, A. 1889a. Many species. Arrigoni degli Oddi, E. 1894a; Finn, F. 1902c. Alaskan birds. Grinnell, J. 1909b. Palearctic birds. Banks, E. 1925.

Alauda. Babin, R. 1910. *Anas*. Angelini, G. 1899. Anatidae. Van Dyck, W. T. 1896. *Asio*. Goddard, T. R. 1935. *Centropus ateralbus*. Rothschild, L. W. 1926a. *Chloropsis*. Berlioz, J. 1917. Includes *Columba* & *Gallus*. Castle, W. E. 1908. Columbae. Van Dyck, W. T. 1896. *Colymbus*. Besserer, L. 1905a. *Corvus frugilegus*. Duns, E. 1889. *Corvus splendens*. Logan, A. C. & Blatter, E. 1906. *Cuculus*. Grabham, O. 1894; Pitt, F. 1910. *Dendrocopos major*. Martorelli, G. 1900. *Emberiza*. Angelini, G. 1911. *Eos fuscata*. Martorelli, G. 1897. *Gallus*. Godbey, C. B. & Reid, D. H. 1931. *Halcyon*. Berlioz, J. 1917. *Lagopus scoticus*. Buckley, T. E. 1882; Wilson, E. A. 1910. *Machetes*. Solomirsky, D. P. 1911. *Melizophilus*. Deleuil, R. 1914. *Picus viridis*. Laubmann, A. 1909a. Psittaci. North, A. J. 1904. *Querquedula*. Arrigoni degli Oddi, E. 1896a. *Somateria mollissima*. Smalley, F. W. & Bonhote, J. L. 1907. *Stercorarius crepidatus*. Selous, E. 1902. *Sula*. Atkinson, J. 1910; Gadeau de Kerville, H. 1903a.

Abrasion. Effects on color. Grinnell, J. 1902.

Effects of climate. Coues, E. B. 1873.

Pattern. Includes birds. Kleinschmidt, O. 1905. *Lyrurus tetrix*. Witherby, H. F. 1912d.

Remiges. *Larus*. Gloger, C. W. 1854c.

Rufous variety. *Perdix montana*. Masefield, J. R. 1902.

Tail color. *Garrulus*. Snouckaert van Schauburg, R. 1904.

Throat feathers. *Coturnix c. japonica*. Kuroda, N. 1924.

EGG VARIATIONS

General. Gloger, C. W. 1854b; Hocker, J. 1870a; Rzehak, E. C. 1893b.

Cuculus. Latter, O. H. 1905; Rey, J. G. 1899. *Falco tinnunculus*. Patten, C. J. 1911a. *Gallus*. Pearl, R. & Surface, F. M. 1914a; Schjelderup-Ebbe, T. 1925. *Larus*. Swynnerton, C. F. 1918a. *Larus ridibundus*. Krause, G. A. 1904. *Passer*. Pearson, K. 1902. *Sterna*. Rowan, W., Parker, K. M., & Bell, J. 1914.

American and European birds compared. *Passer*. *Bumpus, H. C. 1897a, 1898.

Color of eggs. Napier, C. O. 1868b. Many species. Hewetson, H. B. 1892; Wiese, G. 1867b. Palearctic birds. Jourdain, F. C. 1905a. *Cuculus*. Latter, O. H. 1902b; Rey, J. G. 1899. *Gallus*. Pearl, R. & Surface, F. M. 1914a. *Lanius collurio*. Pässler, C. W. 1858. *Turdus musicus*. Patten, C. J. 1909a.

Comparison with eggs of wild birds. *Gallus*. Pearl, R. & Surface, F. M. 1914a.

Correlation with age, season, location in litter cycle, and interval between laying. *Gallus*. *Curtis, M. R. 1914a.

Specific gravity. *Gallus*. Pearl, R. & Surface, F. M. 1914a.

Rate of loss of weight

General. *Gallus*. Dunn, L. C. 1922d, 1923g.

Physical basis. Dunn, L. C. 1923g.

Relation to hatchability. Dunn, L. C. 1924h.

Shape of eggs

General. Napier, C. O. 1868b. *Gallus*. Pearl, R. & Surface, F. M. 1914a.

Cause of egg shape. Seebohm, H. 1893a. Many species. Hewetson, H. B. 1892.

Size of eggs

General. Napier, C. O. 1868b. *Cuculus*. Latter, O. H. 1905. *Falco*. Allen, J. A. 1866. *Gallus*. Pearl, R. & Surface, F. M. 1914a.

Relation to foster parents. *Cuculus*. Latter, O. H. 1902b.

ENVIRONMENTAL FACTORS

General. Many species. Montgomery, T. H. 1896b.

Climate. Coues, E. B. 1873.

Humidity. Beebe, C. W. 1907b, 1912.

GEOGRAPHIC VARIATION

A limited number of references have been included here.

General. Clark, H. L. 1893b; Meinertzhagen, R. 1921d.

Baeolophus. Allen, J. A. 1907. *Barnardius*. Mathews, G. M. 1918. *Certhia* & *Cyanocitta*. Grinnell, J. 1902. *Diglossa*. Zimmer, J. T. 1929b. *Dryobates*, *Empidonax*, *Hylocichla*, & *Junco*. Grinnell, J. 1902. *Lyrurus tetriz*. Lönnberg, A. J. 1905. *Melospiza*. Grinnell, J. 1902. *Motacilla alba*. Sachtleben, H. 1922b. *Nycticorax*. Gross, A. O. 1923a. *Phaethon*. Gross, A. O. 1912. *Platycercus*. Mathews, G. M. 1918. *Regulus*. Grinnell, J. 1902. *Toxostoma*. Grinnell, J. 1917b.

Correlation of geographic distribution with color and size variations. Allen, J. A. 1872.

Effects of humidity. Beebe, C. W. 1907b.

Geographic versus sexual variation. *Oreortyx pictus*. Ridgway, R. 1894.

New and old world comparisons. *Passer*. Townsend, C. W. & Hardy, J. H. 1909.

Number and size of eggs. Allen, J. A. 1876.

Size increase northward. Allen, J. A. 1883.

Terminology. Rensch, B. 1936.

AFRICA

West Africa. Bates, G. L. 1931.

AMERICA**North America**

Alaska. Prince William Sound region. Grinnell, J. 1910.

South Carolina. Loomis, L. M. 1893.

Middle America

Costa Rica. Cherrie, G. K. 1891.

Guadeloupe Island. Noble, G. K. 1916.

South America

Ecuador. Salvadori, A. T. & Festa, E. 1899.

Galapagos Islands. Tubinares [Procellariiformes]. Loomis, L. M. 1918.

EUROPE

Italy. Book. Text in Italian. Giglioli, E. H. 1907.

Lithuania. Sachtleben, H. 1922a.

Macedonia. Book. Text in English. Stresemann, E. 1920.

HABITS, VARIATION IN

Feeding habits. Snell, F. H. 1861b.

Nesting habits. Cockerell, T. D. 1889; Swan, T. 1889.

Nests

General. Brewer, T. M. 1878.

Unusual nest. Trochilidae. Rey, J. G. 1907a.

Voice

General. Dotterweich, H. 1925; Howard, H. E. 1902.

Singing. *Myiochanes*. Craig, W. 1933.

WEIGHT VARIATIONS

Body at hatching, thirty-five days, and maturity. *Gallus*. Latimer, H. B. 1924b.

Body, plumage, liver, blood. *Gallus*. Latimer, H. B. & Pederson, L. T. 1923a, b.

Brain. Immersed in saline solutions. *Loxia*. Wessberge, H. 1913, 1914.

VISION

See also under Behavior, Brain, Coloration, Eye, Habits, and Reflexes.

Books. Text in English. Bielezky, N. F. 1880; Herrick, C. J. 1924; Romanes, G. J. 1884. Includes birds. Morgan, C. L. 1896a. *Speotylo*. Wood, C. A. 1919.

Text in French. Boubier, M. 1926b.

Text in German. Include birds. Hempelmann, F. 1926; Pütter, A. 1912; Treviranus, G. R. 1828.

General. Aldrich, C. 1886; Kolmer, W. A. 1924a; Lee, R. J. 1872a, b. Many species. Lee, R. J. 1873; Lewis, J. C. 1917; *Rochon-Duvigneaud, A. D. 1921; Wood, C. A. 1907. Include birds. Hess, C. 1912, 1914; Schleich, G. 1896. Birds incidental. Dugès, Antoine 1834.

Alcedo a. attis. Kolmer, W. A. 1924c. *Anas*. Morgan, C. L. 1894a. *Caprimulgus europaeus*. Heinroth, O. 1909a. *Cathartes aura septentrionalis*. Leighton, A. H. 1928. *Columba*. Hachet-Souplet, P. 1910, 1911; Kschischkowski, C. 1911. Includes *Columba*. Dewar, J. & M'Kendrick, J. G. 1873. Includes *Columbae*. Kohlrausch, A. 1918. *Falco*. Yarrell, W. 1828b. *Gallus*. *Breed, F. S. 1911, 1912; *Götz, W. 1926; Hess, C. 1907a; Katz, D. & Révész, G. 1907, 1908; Kroh, O. 1927; Kroh, O. & Götz, W. 1926; Kroh, O. & Scholl, R. 1926; Morgan, C. L. 1894a. *Larus argentatus*. Strong, R. M. 1914. *Meleagris*. Caton, J. D. 1870. *Psittacidae* & *Serinus*. Tirala, L. G. 1923. Include *Strigiformes*. Bjerrum, J. 1903; Kohlrausch, A. 1918. Includes *Strix*. Dewar, J. & M'Kendrick, J. G. 1873; Schnaudigel, O. 1903. *Sula* [Moris] *bassana*. Portier, P. 1923c.

Binocular vision. Bjerrum, J. 1903; Lewis, J. C. 1917. *Alcedo*. Kolmer, W. A. 1924c. *Strigiformes*. Bjerrum, J. 1903.

Comparison of vision with smell. *Cathartes aura septentrionalis*. Lewis, J. B. 1928a. *Vultur* [Cathartes] *aura*. Waterton, C. 1833c, e.

Movements of head related to vision. Cinematographic records. *Anas*, *Columba*, *Gallus*, & *Sturnus*. Dunlap, K. & Mowrer, O. H. 1930.

Significance of orientation of lateral vision. Rider, P. R. 1917.

Telescopic vision. *Athene*, *Otus*, & *Strix*. Franz, V. 1907.

Experimental studies

General. *Athene noctua*, *Buteo vulgaris*, *Falco tinnunculus*, & *Otus vulgaris*. Hess, C. 1908b. *Columba*. Kschischkowski, C. 1911; Rouse, J. E. 1905, 1906. Include *Gallus*. Kline, L. W. 1899; Köhler, W. 1915.

Adaptation. *Gallus*. *Honigmann, H. 1921.

Brightness vision. Hess, C. 1908a. *Athene noctua*. Katz, D. & Révész, G. 1914; Kohlrausch, A. & Brossa, A. 1914b. *Columba*. Hess, C. 1907d, 1911b; Kohlrausch, A. & Brossa, A. 1914b. Includes *Falco*. Hess, C. 1911b. *Gallus*. Hess, C. 1907d, 1911b; Katz, D. & Révész, G. 1908, 1921. *Passer*. Tugman, E. F. 1914. *Strigiformes*. Kohlrausch, A. & Brossa, A. 1914b.

Chemical stimulation of optic lobes. *Columba*. Kschischowski, C. 1911.

Comparison with smell. *Cathartes*. Leighton, A. H. 1928; Lewis, J. B. 1929.

Decerebrate bird. *Columba*. Noll, A. 1915; Schrader, M. E. 1891.

Distance and size, perception of. *Gallus*. Thorndike, E. 1899.

Diurnal and nocturnal birds compared. Hess, C. 1908b, 1912, 1914. *Athene noctua*. Katz, D. & Révész, G. 1914.

Experimental analyses of retinal action current. *Athene noctua*. Kohlrausch, A. & Brossa, A. 1914a, b. *Columba*. Kohlrausch, A. 1914; Kohlrausch, A. & Brossa, A. 1914a, b.

Form and size, discrimination of. *Gallus*. Breed, F. S. 1912; Kroh, O. & Götz, W. 1926; Kroh, O. & Scholl, R. 1926.

Form perception. Includes *Melopsittacus* & *Serinus*. Tirala, L. G. 1923.

Influence of experimental lesions in visual apparatus on testis function and sexual characters. *Gallus*. Ceni, C. 1922.

Influence of light upon respiratory movements. *Columba*. Rouse, J. E. 1905.

Iris reactions. *Anas*, *Buteo*, *Conurus*, *Larus*, *Loxia*, & *Strix*. Nepveu, A. 1907a, b. *Athene noctua*, *Buteo vulgaris*, *Falco tinnunculus*, & *Otus vulgaris*. Hess, C. 1908b. *Columba*. Kschischkowski, C. 1911.

Pupillary nerve fibers, course of. Experimental lesions. *Columba*. Noll, A. 1922.

Purkinje phenomenon. Includes *Columba* & *Gallus*. Tschermak, A. 1914. *Turtur* [*Streptopelia*] *risorius*. Yerkes, R. M. 1915.

Sensitivity to light. *Gallus*. Honigmann, H. 1921.

Space perception. Includes *Columba* & *Gallus*. Tschermak, A. 1914.

Visual constants. *Gallus*. Kroh, O. & Götz, W. 1926.

ACCOMMODATION

Book. Text in French and Italian. Includes birds. Ovio, G. 1925.

General. Home, E. 1796; Lee, R. J. 1872a; Lewis, J. C. 1917; Slonaker, J. R. 1920. Includes birds. Hess, C. 1909a, b; Schleich, G. 1896; Zietzschmann, O. 1906. *Astur palumbarius*. Stilling, J. 1911. *Bubo*, *Columba*, & *Gallus*. Exner, S. 1882. Includes *Columba* & *Gallus*. Hess, C. 1909a.

Pecten blood supply. *Astur*. Stilling, J. 1911. *Columba* & *Gallus*. Abelsdorff, G. 1910.

Experimental studies

General. *Columba*. Noll, A. 1922; Pflugk, A. 1906. *Gallus*. Hess, C. 1911a. *Passer*. Slonaker, J. R. 1920. *Phalacrocorax*. *Hess, C. 1910b; Slonaker, J. R. 1920.

Electric and pharmacologic studies. *Columba*. Heine, L. 1898.

Intraocular pressure. Includes *Columba*. Hess, C. 1909b.

Measurements in dipters. *Phalacrocorax*. Hess, C. 1910b.

Notable changes in ciliary body and lens. *Phalacrocorax*. Hess, C. 1910b.

ACUTENESS OF VISION

General. Aldrich, C. 1886; Poulton, E. B. 1904. Includes birds. Donald,

C. H. 1908a. *Vultur papa*. Mackay, R. 1836.

Experimental studies. Includes *Gallus*. *Johnson, H. M. 1914.

Under various conditions. Rochon-Duvigneaud, A. D. 1919a.

COLOR VISION

Book. Text in English. Includes birds. Allen, G. 1879.

General. Dubois, R. 1918; Gorka, S. 1908; Heinroth, O. 1917b; Henning, H. 1916; J., —. 1877; Krohn, H. 1921; Lewis, J. C. 1917; Poulton, E. B. 1904; Révész, G. 1909; Stokoe, P. H. 1877; Wallace, A. R. 1890; White, W. 1891; Anon. 1880. Many species. *Erhard, H. 1923, 1924; Hahn, E. 1917. Includes birds. Frisch, K. 1923; Henning, H. 1920; Klingelhöffer, W. 1916; Tschermak, A. 1914. Birds incidental. Nottram, J. C. & Green, F. W. 1918. Diurnal birds. *Hahn, E. 1917.

Ciconia. Mikolás, K. 1929a. *Columba*. Tegetmeier, W. B. 1877a. *Gallus*. Katz, D. & Révész, G. 1908, 1921; Köhler, W. 1915; Tegetmeier, W. B. 1877a. Includes *Icterus*. Smith, M. 1928. *Passer*. Tegetmeier, W. B. 1877a. *Ptilonorhynchus*. Edwards, H. V. 1920.

Antipathy to purple. *Passer*. Haviland, G. D. 1892.

Blindness to blue. Schuster von Forstner, W. 1925.

Choice of color. *Archilochus colubris*. Pickens, A. L. & Garrison, L. P. 1931. Trochilidae. Pickens, A. L. 1930.

Experimental studies

General. Révész, G. 1909. Includes birds. Hess, C. 1917b. *Athene noctua*. Kohlrausch, A. & Brossa, A. 1914b. *Columba*. Hess, C. 1907a, b, d; Kohlrausch, A. & Brossa, A. 1914b; Rouse, J. E. 1905, 1906; *Watson, J. B. 1915b. Includes *Columba*. Henning, H. 1920; Hess, C. 1912, 1914, 1917b; Höber, J. 1908; Kohlrausch, A. 1918; Tschermak, A. 1914. Includes *Falco*. Hess, C. 1912. *Gallus*. Breed, F. S. 1911, 1912; Hess, C. 1907a, b, d, 1908a, 1910c, 1911a, b, 1917a; Igersheimer, J. & Hahn-Haslinger, E. 1926; Katz, D. & Révész, G. 1905; Kroh, O. 1927; Kroh, O. & Scholl, R. 1926; Thorndike, E. L. 1899; *Watson, J. B. 1915b.

Include *Gallus*. Frisch, K. 1923; Hess, C. 1910c, 1912, 1914; Höber, J. 1908; Köhler, W. 1915; Tschermak, A. 1914. *Melopsittacus undulatus*. *Bailey, F. W. & Riley, C. F. 1931. Includes *Serinus*. Bierens de Haan, J. A. 1924. Strigiformes. Kohlrausch, A. & Brossa, A. 1914b. Includes Strigiformes. Kohlrausch, A. 1918. *Turtur* [*Streptopelia*] *risorius*. Yerkes, R. M. 1915; Yerkes, R. M. & Eisenberg, A. M. 1915.

Discrimination in choice of colors. Gröbbels, F. 1927i. *Gallus*. Breed, F. S. 1912.

Diurnal and nocturnal birds compared. *Athene*, *Columba*, *Otus*, *Strix*, & *Syrnium*. Abelsdorff, G. 1907.

Effectiveness of warning colors in butterflies. Lucas, F. A. 1898.

Effects upon respiratory movements. *Columba*. Rouse, J. E. 1905.

Formation of associations. *Melopsittacus undulatus*. Bailey, F. W. & Riley, C. F. 1931.

Partial color blindness. *Gallus*. Bläser, A. 1926.

CORTICAL OPTICAL CENTERS IN BRAIN

General. Edinger, L. 1896a; Her- rick, C. L. 1895. *Columba*. Edinger, L. 1895.

Median optic center. *Gallus*. Perlia, R. 1889, 1891.

DARKNESS VISION

General. Picidae. Butler, E. A. 1896.

Adaptation to darkness. Experimental. *Columba* & *Gallus*. Hess, C. 1907b.

SHARP VISION REGIONS OF RETINA

General. Many species. Slonaker, J. R. 1897. *Sterna*. Fritsch, G. 1914.

Fovea centralis. Includes *Corvus*. Slonaker, J. R. 1896. *Falco t. tinnunculus* & *Hirundo rustica*. Rochon-Duvigneaud, A. D. 1924. Includes *Junco*, *Parus*, & *Turdus*. Slonaker, J. R. 1896.

Fovea lateralis. *Falco t. tinnunculus* & *Hirundo rustica*. Rochon-Duvigneaud, A. D. 1924.

Frontal and lateral vision. Rider, P. R. 1917.

VITAMINS

Food substances which are essential to normal metabolism and lack of which results in deficiency diseases.

Book. Text in English. Includes *Columba* & *Gallus*. Funk, C. 1922.

General. Norris, L. C., Heuser, G. F., & Wilgus, H. S. 1929-30. *Columba*. Abderhalden, E. 1921b; Abderhalden, E. & Schaumann, H. 1918; Randoin, L. & Simonnet, H. 1924a, b. *Gallus*. Emmet, A. D. & Peacock, G. 1923.

Cod liver oil. Holmes, A. D., Brown, H. E., Smith, J. W., Treadwell, G. B., & Whitelock, W. M. 1926.

Effects of vitamins on comb, wattles, and other organs. *Gallus*. Pugliese, A. & Locatelli, E. 1923.

Egg production. Parkhurst, R. T. & Neidig, R. E. 1923.

Experimental feeding. *Gallus*. Hart, E. B., Halpin, J. G., & Steenbock, H. 1917; Hart, E. B. and others 1930a.

Requirements. *Gallus*. Mitchell, H. H., Kendall, F. E., & Card, L. E. 1923; Plimmer, R. H., Rosedale, J. L., Crichton, A., & Topping, R. B. 1922. Vitamin E. Card, L. E. 1929.

Synthetic diets. *Columba*. Sugiura, K. & Benedict, S. R. 1923. *Gallus*. Hogan, A. G., Guerrant, N. B., & Kempster, H. L. 1925a, b.

Use of cod liver oil and egg yolk in rearing chicks indoors. *Gallus*. Bethke, R. M. & Kennard, D. C. 1925.

Value of vitamins in food. *Gallus*. Knox, C. W. & Lamb, A. R. 1924.

AVITAMINOSIS. VITAMIN DEFICIENCY CONDITIONS AND DISEASES

General. Funk, C. 1912. *Columba*. *Abderhalden, E. 1921b; Abderhalden, E. & Schaumann, H. 1918; Tomita, M., Yutaka, K., & Yuzo, S. 1926.

Effects on tissues. Includes *Columba*. Hess, W. R. & Takahashi, N. 1921.

Egg production. Parkhurst, R. T. & Neidig, R. E. 1923.

Influence of vitamin-free diet on carbohydrate metabolism. *Columba*. Funk, C. & Schönborn, E. 1914.

Involution of testis on vitamin deficient diet with subsequent regeneration. *Columba*. Portier, P. 1920.

Study of metabolism and respiratory exchange. *Gallus*. Anderson, R. J. & Kulp, W. L. 1922.

VARIOUS VITAMINS

Vitamin A

General. *Columba*. Funk, C. 1914a. *Gallus*. Hart, E. B. and others 1924; Hauge, S. M. & Carrick, C. W. 1926a; King, E. J. & Hall, G. E. 1931.

Fed to growing chicks. *Gallus*. Hunter, J. E., Dutcher, R. A., & Kandel, H. C. 1932.

Influence on calcium and phosphorus metabolism. *Gallus*. King, E. J. & Hall, G. E. 1931.

Requirements. *Gallus*. Hauge, S. M., Carrick, C. W., & Prange, R. W. 1926.

Sources. *Gallus*. Heywang, B. W. & Titus, H. W. 1932.

CONTENT IN VARIOUS FOODS

General. Davis, D. E. & Beach, J. R. 1925, 1926; Russell, W. C. & Klein, D. 1931.

Cod liver oil. Cruickshank, E. M., Hart, E. B., & Halpin, J. G. 1927.

Vitamin B

General. Eddy, W. H. 1928; Funk, C. 1912; Hauge, S. M. & Carrick, C. W. 1926b; Kinoshita, R. 1922. *Columba*. Dutcher, R. A. 1918, 1919; Funk, C. 1911, 1913, 1919; Funk, C. & Collazo, J. A. 1925; Funk, C. & Douglas, M. 1914; Funk, C. & Patton, J. B. 1922; Peters, R. A. 1924; Scheunert, A. & Schieblich, M. 1927a, b. *Gallus*. Guerrant, N. B. & Dutcher, R. A. 1933; Hamilton, T. S., Card, L. E., & Kick, C. H. 1927; Scheunert, A. & Schieblich, M. 1927b; Ukai, S. & Kimura, O. 1921. Includes *Gallus*. Dutcher, R. A. 1920.

Effect on feather development and regeneration. Kříženecký, J. & Petrov, I. 1926.

Effect of nitrous acid on. *Columba*. Peters, R. A. 1924.

Polished rice and vitamins. *Columba*. Funk, C. 1914a.

Requirements. Plimmer, R. H., Rosedale, J. L., & Raymond, W. H. 1923. *Columba*. Collazo, J. A. & Funk, C. 1924. *Gallus*. Bethke, R. M. & Kennard, D. C. 1928.

Role in metabolism. *Columba*. Funk, C. 1914b. Includes *Columba*. Drummond, J. C. & Marrian, G. F. 1926.

Significance in secretory function of glands. Includes *Columba*. Cowgill, G. R. & Mendel, L. B. 1921.

SOURCES

Eggs. Osborne, T. B., Mendel, L. B., & Cannon, H. C. 1923.

Maize, rice, and wheat. Chick, H. & Hume, E. M. 1917a.

Oat hulls. *Gallus*. Guerrant, N. B. & Dutcher, R. A. 1933.

Sun-dried vegetables. Includes *Gallus*. Shorten, J. A. & Ray, C. B. 1921.

Yeast. Funk, C. 1912, 1913; Peters, R. A. 1924.

VITAMIN B DEFICIENCY

General. Tasawa, R. 1922. *Columba*. Barlow, O. W. 1926; Kon, S. K. & Drummond, J. C. 1927; Lumière, A. 1920; Ogata, T., Kawakita, S., Suzuki, S., & Kagoshima, S. 1922. Includes *Columba*. Randoin, L. & Simonnet, H. 1924a, b. *Gallus*. Braddon, W. L. & Cooper, E. A. 1914; Ringrose, A. T., Norris, L. C., & Heuser, G. F. 1931.

Action of suprarenal gland. *Columba*. Beznák, A. 1923.

Calcium content of blood serum. *Columba*. Ungar, A. 1927.

Effect of active iron compounds. *Columba*. Suski, P. M. 1927.

Effects on testis. *Columba*. Marrian, G. F. & Parkes, A. S. 1928.

Heat production. *Columba*. Farmer, C. J. & Redenbaugh, H. E. 1925b.

Metabolism and respiratory exchange. *Gallus*. Anderson, R. J. & Kulp, W. L. 1922.

Temporary disappearance of symptoms. Experimental diet. *Columba*. Kon, S. K. 1927b.

Use of glycine. *Columba*. Kon, S. K. 1927a.

Polyneuritis

General. Funk, C. 1912; Ogata, T., Kawakita, S., Oka, H., & Kagoshima, S. 1921; Tasawa, R. 1922. Include birds. Chick, H. & Hume, E. M. 1917a, b. *Columba*. Kinoshita, R. 1922; Ogata, T., Kawakita, S., Suzuki, S., & Kagoshima, S. 1922; Peters, R. A. 1924. *Gallus*. Ukai, S. & Kimura, O. 1921.

Isolation of torulin, anti-neuritic base. Eddie, E. S., Evans, W. H., Moore, B., Simpson, C. G., & Webster, A. 1912.

Experimental polyneuritis

General. *Columba*. Dutcher, R. A. 1918; Eddy, W. H. 1928; Funk, C. 1911, 1913, 1914b, 1919; Funk, C. & Collazo, J. A. 1925; Funk, C. & Douglas, M. 1914; Kartascheffsky, E. 1927; Kon, S. K. 1927b; Ungar, A. 1927. *Gallus*. Anderson, R. J. & Kulp, W. L. 1922; Braddon, W. L. & Cooper, E. A. 1914; Chamberlain, W. P., Bloombergh, H. D., & Kilbourne, E. D. 1911; Chamberlain, W. P. & Vedder, E. B. 1911; *Clark, E. 1914.

Catalase activity of tissues. *Columba*. Dutcher, R. A. 1918.

Decrease in digestive efficiency. *Columba*. Farmer, C. J. & Redenbaugh, H. E. 1925a.

Vitamin C

General. Hauge, S. M. & Carrick, C. W. 1926a.

Requirements. Plimmer, R. H., Rosedale, J. L., & Raymond, W. H. 1923.

CONTENT IN

Certain sun-dried vegetables. Includes *Gallus*. Shorten, J. A. & Ray, C. B. 1921.

Eggs. Hauge, S. M. & Carrick, C. W. 1925.

Liver of chickens fed on scorbutic diets. *Gallus*. Carrick, C. W. & Hauge, S. M. 1925.

Vitamin D

General. Davis, D. E. & Beach, J. R. 1928; Souba, A. J., Kandel, H. C., & Dutcher, R. A. 1924. *Columba*. Funk, C. & Patton, J. B. 1922. *Gallus*. King, E. J. & Hall, G. E. 1931; King, E. J., Hull, H., & Hall, G. E. 1933;

Norris, L. C., Heuser, G. F., & Wilgus, H. S. 1929. Include *Gallus*. Steenbock, H., Hart, E. B., Jones, J. H., & Black, A. 1923.

Amount present in stomach of *Australata lessoni* one-fifth that in cod liver oil. Leigh-Clare, J. L. 1927.

Effect on reproduction. Holmes, A. D., Brown, H. E., Smith, J. W., Treadwell, G. B., & Whitelock, W. M. 1926. *Gallus*. Branion, H. D. & Smith, J. B. 1932; Martin, J. H., Erikson, S. E., & Insko, W. M. 1930.

Tests of effectiveness of vitamin D. *Gallus*. St. John, J. L., Kempf, C., & Bond, L. 1933.

IRRADIATED ERGOSTEROL

Influence on calcium-phosphorus metabolism. *Gallus*. Hall, G. E. & King, E. J. 1931; King, E. J. & Hall, G. E. 1931.

Potency. Russell, W. C. & Klein, D. 1931.

SOURCES

Stearin as source. Roberts, R. E. 1929-30.

Vitamin D content of cod liver oil meal

General. Cruickshank, E. M., Hart, E. B., & Halpin, J. G. 1927.

Anti-rachitic properties. Bethke, R. M., Zinzalian, G., Kennard, D. C., & Sassaman, H. L. 1928; Heuser, G. F. & Norris, L. C. 1926.

Vitamin E

General. *Gallus*. Parkhurst, R. T. 1927.

Requirement for poultry culture. Card, L. E. 1929.

Vitamin G

Oat hulls as source. *Gallus*. Guernant, N. B. & Dutcher, R. A. 1933.

ZOOLOGIES

Textbooks which contain ornithological material, especially on anatomy.

Books. Text in English. Hoeven, J. 1856-58; Parker, T. J. & Haswell, W. A. 1897; Ward, M. A. 1874.

Text in French. Jammes, L. 1904. Includes anatomy and physiology.

Gervais, F. L. 1866. Includes *Pezophaps*. Gervais, F. L. & Beneden, P. J. 1859.

Text in German. Claus, C. F. 1921; Hayek, G. 1877-93; Hilzheimer, M.

& Haempel, O. 1913; Hoeven, J. 1850-56; Kuhl, Heinrich 1820; Oken, L. 1816; Pagenstecher, H. A. 1881; Plate, L. H. 1924; Stresemann, E. 1927-34; *Tiedemann, F. 1810-14; Wagner, R. 1843-47. Atlas. Marshall, W. A. 1898.

CORRIGENDA: PARTS 1 AND 2

- Abderhalden, Emil** 1922. pages 432-486 should be pages 432-459.
- Acconi, Luigi** should be **Acconci, Luigi**.
- Allis, Edward Phelps** 1918. pages 207-306 should be pages 207-326.
- Allison, Andrew** 1907. "Tishoning" should be "Tishomingo."
- Ashby, Edwin** 1929. 54 should be 46.
- Atwood, Horace & Weakley, C. E., Jr.** 1924. pages 1-39 should be pages 1-15.
- Baldwin, Samuel Prentiss & Oberholser, Harry C.** should be **Baldwin, Samuel Prentiss, Oberholser, Harry C., & Worley, L. G.**
- Baudrimont, Alexandre Edouard & Saint-Ange, Martin** should be **Baudrimont, Alexandre Edouard & Martin Saint-Ange, Gaspard Joseph**.
- Beach, B. A., Lothe, H., & Haplin, J. G.** should be **Beach, B. A., Lothe, H., & Halpin, J. G.**
- Beaudette, Frederick Robert** 1926. "aertycke" should be "aertrycke."
- Beebe, Charles William & Lee, S. Crandall** should be **Beebe, Charles William & Crandall, Lee Saunders**.
- Bernstein, Heinrich Agathon** should be **Bert, Paul**.
- Blumenbach, Johann Friedrich** 1798. "Uebe" should be "Ueber."
- Brancher, Pela Fay & Riddle, Oscar** should be **Braucher, Pela Fay & Riddle, Oscar**.
- Branion, H. D. & Smith, J. B.** 1932. "Hatchabilty" should be "Hatchability."
- Brogi, Sigismundo** 1898 and 1903. "monstruosità" should be "mostruosità."
- Brücke, Ernst W.** 1846. pages 370-382 should be pages 370-378.
- Bryant, Harold Child** 1912d. after "Quail" insert "Game Bull. Calif. Fish and Game Comm., No. 1."
- Burkhardt, Rod.** should be **Burckhardt, Karl Rudolf**.
- Butler, Arthur Gardiner.** 1916-17 should be 1916.
- Carver, John Stuart & Garver, Harry L.** "See Carver & Garver" should be "See Garver & Carver."
- Caubet, Celestino Graiño.** Delete reference. See **Graiño Caubet, Celestino**.
- Chapman, Frank Michler** 1890a. pages 123-138 should be pages 123-158.
- Chapman, Frank Michler** 1898a. "Valapa" should be "Jalapa."
- Charrière, A. S. & Bonnet,—** should be **Charrière, A. L. & Bonnet,—**.
- Clark, Hubert Lyman** 1914. "Siculis" should be "Sicalis."
- Cope, Edward Drinker** 1871. 4 should be 14.
- Cornay, Joseph Emile.** 1844a should be 1844.
- Corradori, G.** 1798. Delete reference. See **Carradori,— & Spallanzani, L.** 1798.

- Cossar, Ewart J. 1921. Delete reference. See Ewart, J. Cossar 1921.
- Coues, Elliott Baird. 1878 should be 1878-80.
- Cretzschmar, Philipp Jakob. 1846 should be 1826.
- Crew, Francis Albert 1926d. Delete reference. See Crew, Francis Albert 1927c.
- Cuvier, Georges Léopold 1832. 25 should be 27.
- Czily, Aurel von 1908. Delete reference. See Szily, Aurel von 1908.
- Danforth, Stuart Taylor 1931. "Notes on Birds Observed at Guanico Lagoon, Porto Rico. J. Dept. Agric. P. Rico, 15, 19-106, 8 pls." should be "Puerto Rican Ornithological Records. J. Dept. Agric. P. Rico, 15, 33-106, 8 pls."
- Dareste, Camille 1884. pages 924-296 should be pages 924-926.
- Dickey, Donald Ryder & van Rossem, A. J. 1938. 635 should be 609.
- Düsing, Karl 1883. "beschränk, tem" should be "beschränktem."
- Duval, Mathias Marie 1885a. "historiques" should be "histologiques."
- Ebert, R. & Schulgina, O. should be Ebert, B. & Schulgina, O.
- Elliot, Daniel Giraud 1893-95. "Lonon" should be "London."
- Emmet, A. D. & Peacock, Gail should be Emmett, A. D. & Peacock, Gail.
- Fanchini, G. should be Franchini, G.
- Forbes, Stephen Alfred 1921 should be Forbes, Stephen Alfred & Gross, Alfred Otto 1921.
- Forbes, William Alexander 1880b. "Denham" should be "denhami."
- Friedmann, Herbert 1928a. pages 99-131 should be pages 74-99.
- Funk, Casimir & Douglas, MacKenzie 1914. VII should be VIII.
- G., H. F. 1922. Delete reference. See Gadow, Hans Friedrich 1922.
- Gardner, Leon Lloyd 1930. "Nesting" should be "Nestling."
- Geoffroy St. Hilaire, Etienne 1823b. Delete "dixième."
- Gifford, Edward Winslow 1913. "Cecos" should be "Cocos."
- Goodale, Hubert Dana & Macmullen, Grace should be Goodale, Hubert Dana & MacMullen, Grace.
- Gorsuch, Davis should be Gorsuch, David.
- Gowell, Gilbert Mottier 1905a. pages 93-132 should be pages 93-116.
- Grant, Claude Henry Baxter 1915. pages 225-316 should be pages 235-316.
- Gurney, John Henry 1871. pages 68-96 should be pages 68-86.
- Gurney, John Henry, Jr. 1899 should be 1899a.
- Haecker, Valentin. 1924 should be 1924c.
- Haigh-Lumby, A. "See Lumby" should be "See Lumby, A. Haigh."
- Halpin, James Garfield 1907. pages 113-136 should be pages 225-246.
- Hannas, R. R. 1917 should be 1920.

- Harting, James Edmund 1870. "*fulidarius*" should be "*fulicarius*."
- Hazard, Rowland Gibson 1894. "*Aptenodyes*" should be "*Aptenodytes*."
- Heinroth, Oskar & Heinroth, Magdalena 1924. Delete reference.
- His, Wilhelm, 1890. 26 should be 15.
- Hofman, Max 1900. "*Rückenmarksarterien*" should be "*Rückenmarksvenen*."
- Howell, Arthur Holmes 1918. "*Miarchus*" should be "*Myiarchus*."
- Huxley, Julian Sorrell & Murray, Patrick Desmond Fitzgerald 1924. pages 355-389 should be pages 385-389.
- Irby, Leonard Howard Lloyd 1861. "*Oudhanal*" should be "*Oudh and*."
- Iredale, Tom 1914. "*Kermadee*" should be "*Kermadec*."
- Jacques, F. S. should be Jacques, F. L.
- Jesse, William 1902. "*Luck; now*" should be "*Lucknow*."
- Joly, Nicolas 1860. "*carnivores*" should be "*granivores*."
- Jones, Frederic Sowden 1912-13. Delete reference. See Jones, Frederic Sowden 1913a.
- Jones, Frederic Wood 1913. "*Coelon*" should be "*Coelom*."
- Joy, N. 1918 should be 1868.
- Kashchenko, Nikolai Feofanovich should be Kashchenko (Kastschenko), Nikolai Feofanovich.
- Kelsall, H. J. 1900. "*cinnamonea*" should be "*cinnamomea*."
- Kempster, Harry Laverne & Henderson, Earl W. 1921. page 74 should be pages 75-76.
- Kerr, John Graham 1892. (7) should be (6).
- Kirkman, Frederick Bernuf Bever & Masefield, John R. B. should be Masefield, John R. B.
- Knox, Robert 1824c. title refers to pages 137-140; pages 132-136 have the title "*Observations on the Anatomical Structure of the Cassowary of New Holland*."
- Krauss, Arthur should be Krausz, Arthur.
- Kuffer, Carl Wilhem von & Benecke, B. A. should be Kupffer, Carl Wilhelm von & Benecke, B. A.
- Leone, Nicola de 1908. "*monstruoso*" should be "*mostruoso*"; "*cyanus*" should be "*cyaneus*."
- Lewis, John B. 1928a should be 1928.
- Loomis, Leverett Mills 1918. 41 should be 35.
- Lucanus, Friedrich Karl Hermann von 1911a. "*Physiologie*" should be "*Psychologie*."
- Lynes, Hubert 1924. pages 390-446 should be pages 398-446.
- Mall, Franklin Paine 1887. "*Bronchialbogen*" should be "*Branchialbogen*."

- Mallmann, Walter LeRoy, Thorp, Frank, Jr., & Semmes, Margaret 1928. "Parathyroid" should be "Paratyphoid."
- Malm, August Wilhelm 1880b. "Bromaeus" should be "Dromaeus."
- Marshall, H. 1900. pages 233-241 should be pages 233-244.
- Martorelli, Giacinto 1897. "fuscata" should be "fuscata."
- Mayer, Hans & Jaffé, Max 1878. Delete reference. See Meyer, Hans & Jaffé, Max 1877.
- Mayer, Otto 1928. "Cacutua" should be "Cacatua."
- Mearns, Edgar Alexander 1909. pages 463-468 should be pages 463-478.
- Miller, Alden Holmes 1932. "Carpenteria" should be "Carpinteria."
- Mitchell, Peter Chalmers 1915a. "Rhinochechetus" should be "Rhinochetus."
- Morgan, Conwy Lloyd 1932 should be Morgan, Charles Lee (1895—) 1932.
- Morse, George Byron. 1917 should be 1907.
- Mouquet, Alfred 1922a. pages 45-149 should be pages 145-149.
- Mouritz, G. Beresford should be Mouritz, L. Beresford.
- Nauman, Charles H. 1868. Delete "(Corvus americanus)."
- Naumburg, Elsie Margaret Binger 1930. 69 should be 60.
- Neubaur, Rudolf. 1903 should be 1905.
- Nichols, John Treadwell & Harper, Francis 1916. "Island" should be "Long Island."
- Nitzsch, Christian Ludwig & Giebel, C. G. A. 1862a. pages 408-420 should be pages 408-424.
- Noll, H. 1931. "Larus a. ridibundus" should be "Larus r. ridibundus."
- Nussbaum, Moritz 1877. "Täigkei" should be "Tätigkeit."
- Oberholser, Harry Church 1898. "verginianus" should be "virginianus."
- Ogilvie-Grant, William Robert 1912c. "Ugamiland" should be "Ngamiland."
- Parker, William Kitchen 1860b. Delete reference.
- Pearl, Raymond 1916d. "a ts" should be "salts."
- Percival, Arthur Blayney 1902. pages 581-608 should be pages 581-599.
- Perrin, Maurice & Thiry, G. 1913. 14 should be 45.
- Pézard, Albert, Sand, Knud, & Caridroit, F. 1924k. "Synandromorphisme" should be "Gynandromorphisme."
- Pilliet, Alexander Henri 1893a. 43 should be 45.
- Prenant, Auguste 1911. pages 601-678 should be pages 601-684.
- Pycraft, William Plane 1908g. "Phemonena" should be "Phenomena."
- Pycraft, William Plane 1910b. "cinnammoeus" should be "cinnamomeus."
- Rabl, Carl. 1889b should be 1899; 1889a should be 1889.

- Ranvier, *Louis Antoine*. 1889a *should be* 1889.
- Retterer, *Edouard & Lelièvre, Auguste* 1909. Delete reference. See *Lelièvre, Auguste & Retterer, Edouard* 1909.
- Rettger, *Leo Frederick* 1900. pages 267–273 *should be* pages 267–268.
- Retzius, *Gustaf* 1905. “Christae” *should be* “Cristae.”
- Riddle, *Oscar & Honeywell, Hannah Elizabeth* 1924. Delete last three lines. See *Riddle, Oscar* 1924d.
- Riley, *Joseph Harvey* 1926. pages 1–77 *should be* pages 1–70.
- Römer, *Paul Heinrich* 1903. pages 1–150 *should be* pages 1–160.
- Rogers, *Fred Terry*. 1922 *should be* 1922a.
- Rusinova, *K. I.* 1926. pages 153–175 *should be* pages 159–175.
- St. Clair, *Feilden G.* 1914. Delete reference. See *Feilden, G. St. Clair* 1914.
- Schenk, *Jakab*. 1909 *should be* 1909a.
- Schimkewitsch, *Vladimir Mikhailovich* 1902a. “Untersuchnugen” *should be* “Untersuchungen.”
- Schrader, *Justus* 1674. “Langley” *should be* “Langly.”
- Schröder van der Kolk, *Jacobus Ludovicus Conradus* 1841. Delete reference.
- Scott, *William Earle Dodge* 1891a. “Phaeton” *should be* “Phaëthon.”
- Selenka, *Emil* 1870b. 1891c *should be* 1891d.
- Skillen, *James*. 1914 *should be* 1894.
- Skovgaard, *Peter* 1925d. “cinera” *should be* “cinerea.”
- Smart, *T. P. Anderson* 1891. Delete reference. See *Stuart, Thomas Peter Anderson* 1891.
- Stafseth, *Henrik J. & Mallman, Walter LeRoy* *should be* *Stafseth, Henrik J. & Mallmann, Walter LeRoy*.
- Struthers, *Parke Hardy* 1927. “Island” *should be* “Islands.”
- Surface, *Frank Macy* 1913. Delete reference. See *Curtis, Maynie Rose* 1914b.
- Taylor, *Walter Penn & Shaw, William T.* 1927. “Ranier” *should be* “Rainier.”
- Teachenor, *Dix* 1927. 14 *should be* 44.
- Terni, *Tullio* 1924a. “et” *should be* “e.”
- Thayer, *Abbott Handerson* 1911. Auk, 28, 146–148; 1912, 29, 430–431, 460–464 *should be* Auk, 28, 146–148, 460–464; 1912, 29, 430–431.
- Ťicehurst, *Claude Buchanan*. 1922 *should be* 1922b; 1922b *should be* 1922c.
- Tomásek, *K.* 1891. 81 pp. *should be* p. 81.
- Warnecke, *Paul* *should be* *Warncke, Paul*.
- Waterton, *Charles* 1833c. “aura” *should be* “Aúra.”
- Waterton, *Charles* 1833e. “aúra” *should be* “Aúra.”
- White, *Henry Luke* 1916. “Uroactus” *should be* “Uroaëtus.”

Winge, *Adolf Herluf* 1909. "Math.-fys. Medd." should be "Vidensk. Medd. naturh. Foren. Kbh."

Witherby, *Harry Forbes* 1903. "Faro" should be "Fars."

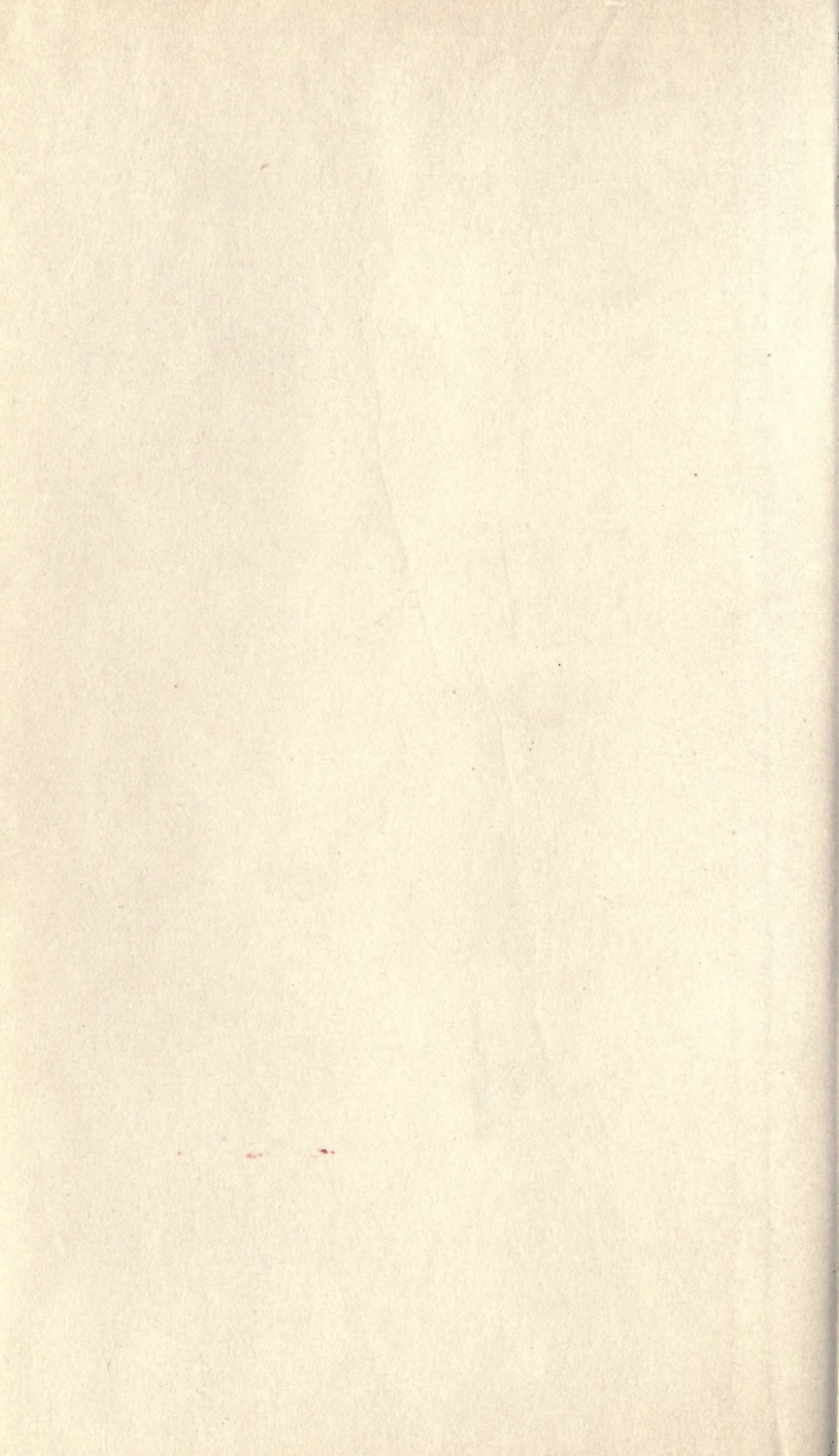
Yocom, *Harry Barclay & Philipps, Ben I.* should be Yocom, *Harry Barclay & Phillips, Ben I.*

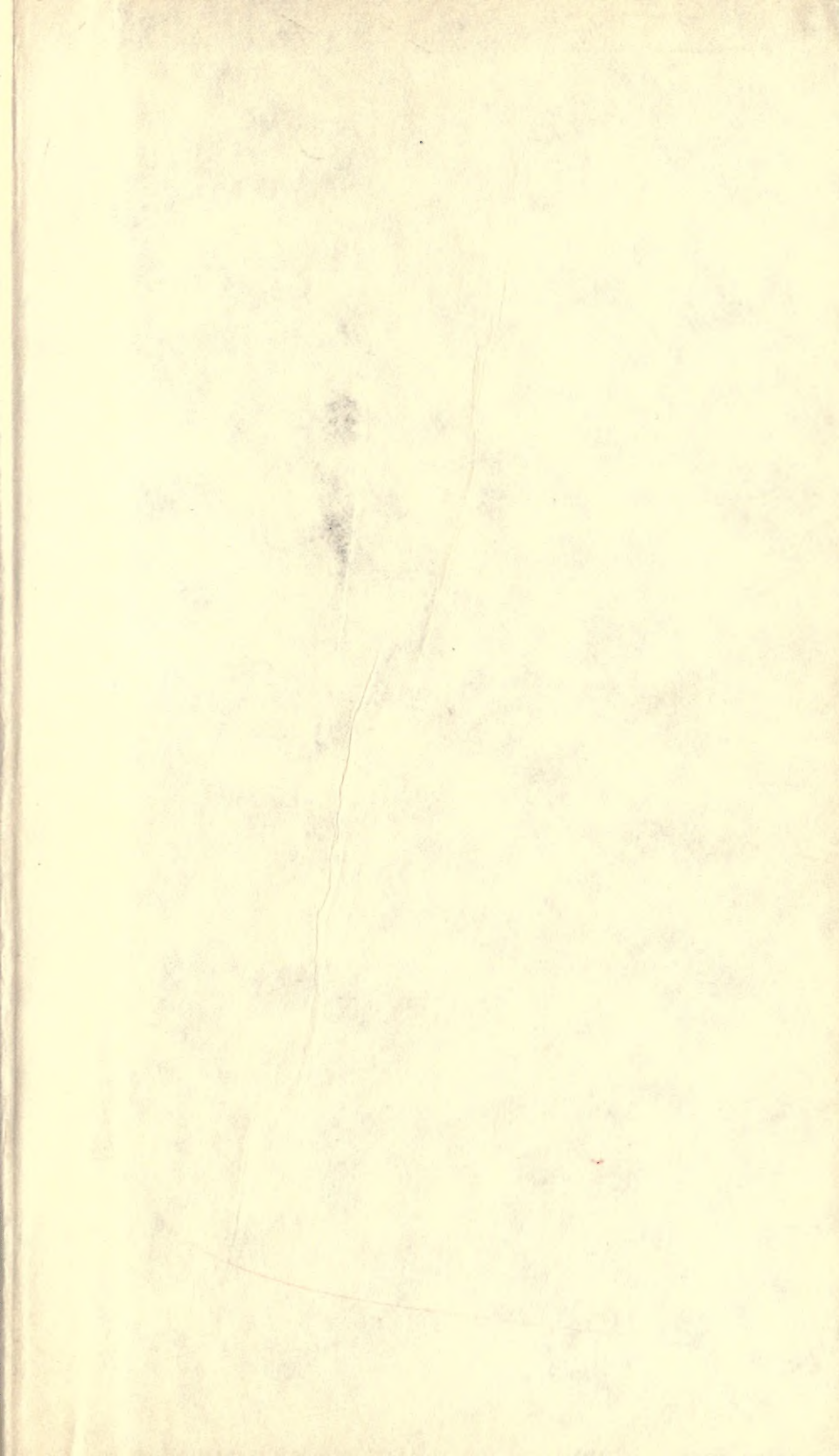
Young, *J. Dent* 1931. 1932, (13), 2 should be 1933, (13), 3.

Zimmerman, *Emil Rudolf* 1906. 71-72, 149-155 should be 71-72, 73-92; 1909, 73-75, 149-191.

Anon. 1910. Delete "*Perdrix blanche*."







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